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Students and Discourse: an Insider Perspective

Christine Moira Sinclair, BA, MA

Submission for the Degree of Doctor of Philosophy at the Open University

Centre for Language and Communication, Faculty of Education and Language

Studies

Submission date: 22 April 2004

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Abstract

A student's direct experience is used to explore the hypothesis that student problems may be associated with lack of exposure to appropriate discourse. I became a student again to find out about discourses that students encounter.

Literature associated with student experience is reviewed from two perspectives: phenomenography and sociocultural theory. A critique of the former highlights the pervasive deep/surface/strategic distinction with respect to approaches to learning and suggests that there may be alternative descriptions that take more account of students' responses to discourse. While phenomenography offers some valuable observations on variation, the emphasis on outcomes and student predilections may mask some other important aspects of student experience. Sociocultural theory offers more reference points, at individual, social and cultural levels of analysis.

I took an HNC and then a university module in Mechanical Engineering and used a reflective journal to record "what a student notices". I used this to produce "thick descriptions" of what was happening – that is, descriptions that took account of the sociocultural context and also of my own intentions and internalised responses to the discourse. I explored exposure and barriers to four kinds of discourse: engineering, pedagogic, institutional and social. I then reviewed evidence for progress with the discourse.

The thesis contributes insights into the many actions that a student undertakes in an attempt to engage in the activities of tertiary level education. A number of tensions and contradictions in higher education from a student's perspective are highlighted in the study. For example, access to HE may exclude access to its discourses; "outcomes" are not necessarily what they appear to be; some assessment may say more about a student's potential than about what they can do unaided. To succeed, students need a good deal of exposure to appropriate discourse practices as well as time to assimilate them.

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Glossary

action	What an individual does intentionally.
activity	<p>The use of this word in the thesis specifically relates to activity theory.</p> <p>1. A term that refers to what people do collectively, incorporating both social and cultural processes and internalised (mental) functions. 2. A specific unit of such processes and functions; under this definition, an activity is always social even when performed in isolation. An activity is motivated by an object and is actualised through goal-driven action.</p> <p>There are two broad activities considered in this thesis: <i>tertiary level education; research into student experience</i>. However, towards the end of the thesis there is increasing reference to the target activities of mechanical engineering.</p>
activity theory	A theory developed from Vygotskian concepts that emphasises the role of practical social and cultural activity in mediating the development of consciousness; it looks at three strata of experience: activity, action and operation .
community of practice	An informal spontaneously occurring group of people engaged in a particular activity or practice.
deep and surface	Description of approaches or orientations to learning, with the former focusing on what is signified by the discourse and the latter simply on the sign itself.

discourse	1. Organised and structured use of language, emphasising the fact that people use language to do things. 2. A specific example of such use (e.g. pedagogic discourse); such examples draw on genres and other socially located forms of communication that may be multimodal (i.e. using a mix of text, graphics, numbers, symbols etc).
discourse practice	Action that belongs to a discourse – used either in the sense of habitual practice or one particular instance of it. The main use of the expression here is to highlight the actualisation of discourse; it therefore has a more practical than theoretical connotation.
field dependent	Displaying a tendency towards global processing of information, not separating elements of information from their background (as field independent people do).
genre	A term, used only rarely in this study, that refers to a typical form of speaking or writing that has distinctive and recognisable features.
halo effect	A positive judgement of a person on the basis of few or irrelevant characteristics.
learning outcome	1. A response to a learning task. (2) A statement of intent about what a learning task should achieve. (3) A piece of assessment. The use of the term varies according to different people and context.
ontogenesis	The history of the development of an individual being; contrasted with <i>phylogenesis</i> – a genealogical history.

operation	Method by which an action is made to happen, dependent on relevant conditions; the subject already knows how to perform operations (otherwise, these would have to be reclassified as goal-related actions). This is mainly referred to here with respect to activity theory; reference to arithmetic operations also conforms to this definition.
outcome	A consequence or result (but see learning outcome).
outcome space	In phenomenography , the set of hierarchically ordered results of an inquiry, focusing on variation rather than a detailed description of the phenomenon itself. Variation in conceptions is generally shown to be internally linked, hence the hierarchical ordering. Although variation is their object, phenomenographic studies often identify correlations between (successful) outcomes and processes.
phenomenography	Study of variation in people's experiences of phenomena.
practice	The process of carrying something out; action or habitual action, in this context having a particular relevance to vocational, professional or other types of work. See also community of practice and discourse practice .
sociocultural	Pertaining to social and cultural aspects of a phenomenon, usually underpinned by the view that the presence of these is both inevitable and ubiquitous.
sociocultural theory	A theory developed from Vygotskian concepts that considers human learning and development (both ontogenetic and

phylogenetic) and emphasises semiotic mediation, particularly relating to language.

text	An object produced in discourse, which may be spoken or written. It is used exclusively here with respect to the main source of data – written text in a journal.
thick description	An account of an event or situation that includes relevant information about the sociocultural context which allows meaningful interpretations to be made; it contrasts with “thin” description, where an action is described without the possibility of such interpretation.
ZPD	Zone of Proximal Development. Vygotsky’s notion of the distance between what can be done unaided and with assistance

1. Introduction

1.1 Background to the study and research questions

Since well before the start of the twenty first century, there has been an increasing concern in colleges and universities about students' adjustment to academic discourse practices. Staff complain about students' inability to present information in academic writing or to use "educated" genres. There is also a preoccupation with the level of plagiarism, especially that associated with the internet. External examiners criticise students' skills in grammar and their use of academic conventions such as referencing. As well as surface issues such as these, there is a feeling that many students are unable to "apprehend the structure of the discourse" (Laurillard, 2002:62) of the subject they are studying – that is they do not understand what is signified by the texts they encounter in their disciplines. This thesis originates from a similar concern about students' ability to relate to discourse and has a particular focus on how the relationship appears to the students themselves.

The evidence for student difficulty is not simply anecdotal – an older generation regretting declining standards, although there is much of that. Research papers and books on higher education, written largely from a perspective of emphasis on the student experience, record the types of difficulty that students encounter (for example, Marton, Hounsell and Entwistle, 1997; Ivanic, 1998; Biggs, 1999; Prosser and Trigwell, 1999; Lea and Stierer, 2000; Laurillard, 2002; Northedge, 2002). A frequent example given is knowing what is expected in an academic essay: understanding the norms of academic writing. Some writers refer to widening access

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learners". The labels have arisen from studies on "deep", "surface" and "strategic" approaches or orientations to learning (for example, Marton and Säljö, 1976a; 1976b; Dahlgren, 1997; Entwistle, 1997; Biggs, 1999; Prosser and Trigwell, 1999). The student who adopts a "surface" approach conceives of learning as memorising, and regurgitates material in an exam or essay without any evidence of understanding or having acquired the relevant discourse. The more desirable "deep" approach aims for understanding. The "strategic" approach or orientation, identified some time after the original distinction, leads the student to find out about requirements and also to develop personal strategies that work for the specific tasks to be done. The original authors do not attribute these "approaches" to students' personal characteristics, though some later ones do (see Chapter 2).

While the work relating to the deep and surface distinction does have some significance for the present study, my concerns about "labelling" students led to a desire to investigate the problem in a different way. Suspecting that students' relationships with academic discourse are too complex to be fully accounted for by a theory of orientation to learning or observations about variation in conceptions – although both might be relevant – I wanted to find out what happens with discourses within specific classrooms, from inside those classrooms. I became a student again myself in order to identify, observe and interpret students' relationships with the discourses to which they are exposed and what they do in response to the discourses. I chose a subject I did not know, mechanical engineering, partly because I was teaching communication skills to students of this discipline and partly because I felt intuitively that I might find the subject manageable and interesting, despite my Arts background. (There would have been no point in pursuing a subject

that would not be at least potentially engaging.) My broad aim was to see whether my own direct experience would provide additional information to contemporary thinking on student experience and academic discourse.

This then is an account and interpretation of my participation in the discourses relating to academic communities based in the West of Scotland. I participated in two communities: one studying for an HNC in Mechanical Engineering at a further education college and one taking a second level engineering module at a post-1992 university. I kept a journal recording my own experiences and observations about lecturers, fellow students, the environment, use of artefacts and other relevant factors.

The main focus of the study is on the discourses and discourse practices encountered by students in the distinctive academic communities in further and higher education. Kress has defined “discourse” as that which “organises and gives structure to the manner in which a topic, object or process is to be talked about” (Kress, 1989:7). This is a useful definition for considering a student’s experience, as students must talk about their academic disciplines in a specific way. They need to use appropriate “discourse practices”, actions that sustain the discourse and allow for its development. Like Kress, and many of the other writers discussed here, I emphasise in my account what we are actually *doing* when we are talking, writing, calculating or even using visual representation within a discourse.

In my dual roles as student and researcher, I had direct access to a student's responses to the discourse practices used in the classroom exchanges and the texts of

the courses. I was also able to observe the other participants' responses and compare them with my own when appropriate. While welcoming the current emphasis in the literature on students' experience, I wanted to take it further and discover first hand what it actually means to be a student and have to respond to academic discourse from that perspective.

At the start of this chapter, it was suggested that knowledge of academic discourse conventions may be more related to exposure than to innate ability. The thesis uses the journal from the experience of being a student as the main source of data to explore this hypothesis through the following questions:

1. How do students engage with discourse practices in an academic environment?
2. Is a focus on academic discourse practices – rather than one on “learning” – useful for exploring what happens to students?
3. What can the students' perspective on their experiences offer that is additional to current research?
4. What do the findings offer for analyses of current issues in higher education?

1.2 The changing context of tertiary level education

As suggested by the questions above, context plays a significant role in this study and it will therefore be useful to provide an initial broad sketch of its relevant features. At the time when the study was undertaken (1997-1999), participants in tertiary level education in the UK were experiencing considerable change. The recently expanded university sector (with the incorporation of polytechnics in 1992)

was subject to further expansion within individual universities. The rapid increase in student numbers meant that students were coming into higher education with a wider range of background experience at a time when class sizes were increasing. The “typical” undergraduate student was no longer the middle-class high-achieving school leaver with a good set of Highers or A Levels . There was an increase in the number of mature students, from a wider range of social backgrounds and with a wider variety of experience.

At the same time, many of the courses that the students were taking were changing, as were their routes into them. Some students were going from colleges to universities, directly into second or third level modules (that is, classes that might previously have been described as second or third year ones). In universities, flexible programmes allowed students to work for a degree at their own pace. On the surface at least, universities seemed to be adopting some of the features of the colleges, with programmes put together from modules which were increasingly based on statements of “learning outcomes” or similar.

New technologies were beginning to emerge: use of email and the internet would ultimately result in new ways of engaging in discourse, though these were not particularly evident in this study. However, the ideas about “borderless education” exemplified in e-learning approaches and virtual learning environments were available at the time.

Some commentators view this changing context not simply as interesting background but, as one which has “serious repercussions on the day-to-day affairs of

academic practice" (Light and Cox, 2001:3). For example, the changing context itself "forms an integral feature of writing and assessment practices" (Lea and Stierer, 2000:3). Such writers therefore preface their analyses with an account of the radical changes in the environment in order to demonstrate that the change itself has a constitutive role. The nature of higher education has changed because its students and their programmes have changed. The experience of being an individual student reflects the context in which it takes place, which has itself been shaped by individual students along with other features in the environment. The current thesis should then be regarded as providing a snapshot of experience in Scottish further and higher education within the period 1997 to 1999, thus contextualised in place as well as time.

The interplay of student experience and the changing context of academic institutions is a feature of a number of studies, for example: student writing in new contexts (Ivanic, 1998; Lea and Stierer, 2000; Lillis, 2001); professionalisation of higher education teaching (Biggs, 1999; Light and Cox, 2001; Laurillard, 2002); retention of students in a mass higher education system (Armstrong, 1996); the role of the university in society (Barnett, 1997; Brown and Duguid, 2000). In turn, these studies contribute to the discourses of and about tertiary level education and thus to the changes in the context. The topics in that list all provide a backdrop to the current study, which will include references to pedagogical, institutional and societal issues, as well as students' writing (though fewer of the latter than would be found, say, in research on academic literacies).

The present thesis aims to contribute to this growing body of research by asking questions about the discourses to which students are exposed within the changing context, as identified in the research questions in Section 1.1 above. As with the studies already mentioned, it is based on the view that students' experiences both reflect, and are reflected by, the culture in which they take place. Thus discourses to which students are currently exposed shape not only the students but also the activity of tertiary level education itself, as the students transform the discourses into their own future practice. If students are not exposed to academic conventions through discourse, then those conventions may themselves disappear.

1.3 Structure of the thesis

The key features of the approach are highlighted in the structure of the thesis. Chapter 2 begins with a review of literature on student experience of higher education to identify how data about student experience are currently elicited, categorised and explained. This highlights the potentially promising phenomenographic approach which studies variation in people's conceptions and experiences, and outcomes associated with this variation. The main method used in phenomenography (interviewing and categorising responses) is considered in relation to academic discourse. Attention to discourse draws out some methodological issues that might suggest some value in an insider's perspective, but the latter would also require a different framework. Sociocultural theory – with its focuses on practice, meaning, mediation, discourse and social interaction (Claxton, 2002; Säljö, 2003) – provides such a framework. Sociocultural theory is then

reviewed with a view to accounting for a new student's relationships with discourses.

The current study provides a “thick description” (Ryle, 1968; Geertz, 1973) of what happens in a classroom: that is, it aims to reflect what is actually going on, not just what appears to be. This entails consideration of the social meanings in discourses, activities and artefacts in the classroom as well as the internalisation of such meanings by an individual student (Vygotsky, 1934/1987). Attention is given to the view of engaging in discourse as “doing” something, a stance that is taken up by writers from a variety of fields. Here the work of the activity theorists is particularly highlighted – following Leont'ev (1981a) who developed activity theory from Vygotsky's ideas. Some tools from activity theory are useful for the present study – particularly the characterisation of goal directed actions subordinated to an activity. Consideration of action allows a different perspective on the issue of intention from that found in phenomenography.

Principal concepts explored in the literature review are: a student's induction into an academic “tribe” or community of practice; the role of the teacher as a guide through the specialist discourse; the educational institution as a site of many (sometimes competing) discourses; discourse and learning as social practices.

The literature review establishes a rationale for the method described in Chapter 3. The experience of being a student is captured directly through a reflective journal which also records observations about other participants in the community of practice (Lave and Wenger, 1991) from within that community itself. The journal is

then the main source of information about the discourses to which the students in the HNC and the university module were exposed and their immediate responses to these discourses. “Exposure” is a key issue for the analysis; the kind of information that was subsequently available from the journal depended on the extent to which students were exposed to specific discourses. The journal entries form the main data set; this chapter also describes the processes involved in deriving themes and tools for analysing these data. The **activity** of tertiary level education is to be explored through an account of an individual’s **actions** subordinated to that activity.

There are three chapters (4 to 6) on the results of the study; these explore, respectively, exposure, barriers and progress in relation to the discourses students encounter. In each case, extracts from the reflective journal are presented and a commentary offers an interpretation and comparison with other writing on the issue. The emphasis is on what the students did in response to exposure and barriers to discourse; actions that are viewed as providing evidence of progress are then further explored to identify significant themes.

In Chapter 7 there is a discussion of the implications of the results, highlighting the suggestion that a focus on discourse from a student's perspective, using the idea of “action” as a tool for analysis, might offer alternative explanations to situations described in other literature. The insider's lens is turned back on some of the issues raised in the literature review, especially deep and surface learning, the use of learning outcomes and the engagement of a student in a new community of practice.

The final chapter revisits the research questions and considers their implications for higher education in the immediate future, especially from the perspective of the main theoretical positions and concepts currently influencing higher education. Following a contemporary strand of activity theory, the tensions and contradictions in higher education theory and practice which are highlighted by the study are considered as sources of development. There is a potential for insider perspectives to contribute further to this development, though limitations are also acknowledged and alternatives considered.

2. Literature Review: The Role of Discourse for Phenomenography and Sociocultural Theory

Two broad perspectives are considered here: the phenomenographic and the sociocultural. The perspectives have been selected both for their relevance to an exploration of students' experiences and because they are significant in education literature for the period covered by the study (1997-1999) and the time of writing it (up to 2004). They therefore play a part in shaping the context as well as making a commentary on it. The current study fits more into the sociocultural perspective, but is in some respects a response to the dominance of phenomenography at the time of writing.

Phenomenography and sociocultural theory share a significant feature that enhances their potential appeal in describing a student's relationship with discourse. Both are relational perspectives (Ramsden, 1987): that is, they are concerned with the *interaction* of the person with the environment rather than separate characteristics of individuals or of "processes" such as teaching. They are thus non-dualist in nature; that is, they are not constrained to consider only the mental or only the material because of an insistence on the separation of these. The recognition of the significance of the context extends to *what* is studied; a study with "ecological validity" should be derived from the appropriate setting rather than artificial experiments (Entwistle, 1997:11).

The current study presents an insider's view of student experience of discourses encountered during initiation into a new discipline. Students' voices do already feature in contemporary literature on higher education, but these accounts are generally of a second-order nature: that is, the students' experience is presented by the researcher, rather than first-hand, and it is the researcher who selects quotations to illustrate specific issues or to provide evidence for a particular standpoint. Thus the researcher determines what is significant in the students' experience. This chapter explores how the literature elicits such quotations and how it categorises students' experiences; it seeks out evidence from education literature on how students, especially at tertiary level, experience discourse. It considers both the broad experience of discourse from a theoretical perspective and the practical experience of language as action – discourse practices – a distinction that is further explored in the boxed definition on the following page.

The literature is reviewed not only for theoretical frameworks and insights into student experience, but also to identify potential contributions that an insider view might make. The review therefore has methodological implications as well as providing a context for the results of this particular study.

Discourse

1. Organised and structured use of language, emphasising the fact that people use language to do things.
2. A specific example of such use, e.g. academic discourse, pedagogic discourse

Discourse practice

Action that belongs to a discourse – used either in the sense of habitual practice or one particular instance of it. The habitual aspect is what sustains the discourse.

Each of the words “discourse” and “practice” has what Fairclough describes as a “‘felicitous ambiguity’...both can refer either to action or to convention” (Fairclough, 1989:28). This is felicitous because it underlines the social and conventional nature of our actions. Fairclough defines discourse as “language as a form of social practice”, and there is certainly an implication of this in my own definition above, but I particularly want to highlight the attributes that will be relevant to student appropriation of discourse – the recognition that it is structured in order to enable people to do things. I also want to reserve the expression “discourse practice” for occasions when I am referring to actual experienced instances of discourse.

The writers whose views on discourse I cite (Bernstein, Fairclough, Halliday, Ivanic, Kress, Lillis, Mercer, Säljö, Wells, Wertsch, Vygotsky) do all regard discourse as a social practice, but might foreground different issues with respect to it. Thus the emphasis might be on (in no particular order): language as a system or frame, on action, the actors, culture, genre, meaning or even a territory. Yet all the writers are still discussing “discourse”. While I use these writers to inform my approach, for my own analysis, I specifically want to distinguish between *discourse* as a theoretical construct and *discourse practice* as an action. A similar distinction will be seen later between *activity* and *action*.

I am interested here in both (a) the discourse practices that students engage in in the “here-and now” of their classrooms and (b) the target discourse practices that they need to acquire in their discipline.

Definitions of terms in this study: (1) Discourse and discourse practice

2.1 The experience of higher education: a phenomenographic approach

The deep/surface distinction referred to in Chapter 1 belongs to a strand of contemporary literature on student experience that highlights variations in students' conceptions, approaches to learning and actual learning outcomes. This work spawned a research perspective known as "phenomenography", a specialisation founded by Ference Marton and defined by him as:

the empirical study of the differing ways in which people experience, perceive, apprehend, understand, conceptualise various phenomena in and aspects of the world around us.

(Marton, 1994:4424)

There have been many papers and a number of objects of study for phenomenography, for example: students' conceptions of learning (Säljö, 1979); the relationship between conceptions and approaches to learning (Van Rossum and Schenk, 1984); essay writing (Hounsell, 1997); teachers' conceptions of teaching (Trigwell and Prosser, 1991). For many practitioners in education, however, the salient issues from the original and subsequent papers are the distinction between deep and surface approaches to learning, and the implications of that distinction for teaching. There have undoubtedly been well-established correlations between conceptions and approaches to learning (and teaching) and the subsequent success of students in their course.

The aspects of phenomenography relevant to this study, however, are those that provide a perspective on discourse. The search for insights on discourse reveals two ironies which are explored in detail below. The first is that the work originated in a consideration of the way that students respond to discourse, but it subsequently lost this focus for many of its followers; the second is that there are variations in the discourse practices about the findings of phenomenography itself, especially in relation to the deep/surface distinction. The exploration of these ironies provides a review of phenomenography that considers both its development and its impact on practitioners – the way it contributes to discourses *about* higher education.

2.1.1 Irony 1: a loss of emphasis on discourse

The original work by Marton and Säljö (1976a; 1976b) on qualitative differences in learning describes the findings of an experiment when a group of students was asked to read a substantial piece of text and then answer questions on its meaning and also comment on how they had approached the task. Their paper takes as its starting point the view that:

a prerequisite for an analysis of *what is learned* is that one must take into account the *content* of the learning task or the discourse.

(Marton and Säljö, 1976a: 4, emphasis in original)

The researchers discovered four different *outcomes* to a question they asked about the text that the students had read, varying in response to the “intentional content” of the original author of the text. Marton and Säljö then set out to explore whether

differences in outcome might be explained by differences in processing, and they distinguished processing in terms of “surface-level” and “deep-level”. They inferred these differences on the basis of comments from students about what they were attempting to do, for example:

“Well, I just concentrated on trying to remember as much as possible.”...

“...and what you think about then, well it's you know, what was the point of the article, you know.”

(Marton and Säljö, 1976a:9)

Their paper actually defines “deep” and “surface” in terms of discourse:

In surface-level processing the subject focuses on *the sign* (i.e., the discourse itself or the recall of it)...

Deep-level processing indicated that students had concentrated on *what is signified* (i.e. what the discourse is about).

(Marton and Säljö, 1976a: 9, their emphasis)

This direct reference to the semiotics of Saussure (1974: originally 1916) in terms of “sign” and “signified” suggests that the authors took a linguistic perspective that appears to be lost in later books and papers based on Marton and Säljö's work. In many of these studies, the emphasis is much more on outcomes associated with conceptions and approaches. Although conception, approach, outcome – and the interview to elicit information about them – all exemplify responses to discourse, explicit reference to the discourse of the situation is missing. There are notable exceptions; for example, Dai Hounsell's work (1987; 1997) on the variations in

conceptions of essay writing brings out responses to the academic discourse with which students are attempting to engage. Diana Laurillard's (2002) model of a "conversational framework" builds on phenomenographic ideas to explore discursive interaction necessary for learning. In general, however, phenomenographic accounts do not appear to be concerned with the discourses of the situation.

The lack of regard for discourse has been noted in a paper by Säljö himself written two decades after their original work:

To me, phenomenography has a weak spot in its lack of a theory of language and communication, and in its almost dogmatic disregard for paying attention to why people talk the way they do.

(Säljö, 1994: 3 Internet version)

Säljö's main concern in his 1994 paper is with the discourse practices surrounding the process of obtaining the information – the methodology associated with phenomenography itself. He suggests that researchers may be ignoring the situated nature of the interviews that they conduct. Responses elicited from students about their conceptions are to some extent how they regard their conceptions within the context provided by the actual interview. The data are thus data about discourse, but this aspect tends to be ignored by the researchers.

2.1.2 Irony 2: variations in conceptions of phenomenographic findings

This subsection explores issues relating to the notion of “outcome” in phenomenography. It suggests that there may be a lack of clarity over whether a description is an *outcome of learning* or an *outcome of an inquiry* and also brings out the irony that different readers have their own varying “outcomes” from their reading of phenomenographic studies.

The original papers by Marton and Säljö (1976a; 1976b) emphasised that there were differences in outcome for students’ reading depending on the processes they used. Marton later used a description of similar experiments to explain how phenomenographers deal with the results of a phenomenographic inquiry:

By drawing on the logical relationships found between the different ways of understanding the text, a hierarchy was established between categories of description. Such an hierarchically ordered set of categories is called the outcome space.

(Marton, 1994:4424, my emphasis)

The word “outcome” here has a dual reference; it refers to the outcomes of the students’ experience (reading) but as the researchers are interested in the variation of such outcomes it also refers to the results of their inquiry. Students’ outcomes have first been categorised and then the categories have been ordered hierarchically. The outcome space – the result of a phenomenographic inquiry – therefore does not refer to an *individual’s* outcome of learning.

However, the following brief review of some of the history of phenomenography does show that not only is there an interest in individuals' outcomes, but there are also several interpretations of what such an outcome space might be saying.

In a phenomenographic study, variations in experience are identified usually through interviews and ordered hierarchically in descriptive categories, determined by the researcher but based on the data. An example of a hierarchical ordering of categories is evident in a paper by Säljö who identified five **conceptions of learning** in a group of adults that he interviewed:

1. A quantitative increase in knowledge
2. Memorising
3. The acquisition, for subsequent utilisation, of facts, methods, etc
4. The abstraction of meaning
5. An interpretative process aimed at understanding reality

(Säljö, 1979)

These can be seen as increasingly complex conceptions of learning, with each one capable of being subsumed in the level above, though as Säljö and others (see below) recognised, there is a substantive difference between the first two conceptions and the final two. This hierarchy has featured in a number of the phenomenographic projects already mentioned, notably Van Rossum and Schenk (1984) who found a close correlation between students' *conceptions* of learning and their *approaches* to learning.

The development of phenomenographic projects brought some shifts in terminology and also some large-scale studies based on inventories relating to deep, surface and strategic approaches and orientations. The best known of these are the *Approaches to Study Inventory* (Entwistle and Ramsden, 1983) and the *Study Process Questionnaire* (Biggs, 1987) which arose from separate research efforts but their categories and findings proved to be very similar. Such studies encouraged researchers and, importantly, higher education practitioners, to survey students to identify their “predilections for different approaches to study” (Biggs, 1999:17). In this way, the terms “deep” and “surface” found their way into the classroom, often as a stage in identifying and supporting “at risk” students.

It was this development that led to the second irony: varying conceptions of the deep/surface distinction. How this happened can be inferred from the work of Biggs, one of the originators of an inventory. He says that Marton and Säljö:

...speak of approaches as entirely determined by context, as if students walk into a learning situation without any preference for their way of going about learning

(Biggs, 1999:17)

At the other extreme, there are people who view approaches to learning as fixed “learning styles”. For Biggs, the “truth lies in the middle”, allowing him to use questionnaires that reveal predilections (or tendencies towards a particular approach), but also pointing to the adaptations that students make to their practices in different teaching environments.

Biggs' characterisation of the Marton and Säljö approach sits uneasily with their claim that students failed to get the point *"simply because they were not looking for it"* (Marton and Säljö, 1997:43, emphasis in original), which does suggest that they were going about learning deliberately. But Biggs' identification of the "truth" as a golden mean between students being hardwired towards an approach or that approach being completely determined by context does highlight at least potential differing conceptions.

The second irony about deep and surface approaches is then that a research perspective that finds variation in conceptions is itself subject to such differences and that this has an effect on its conclusions. Three varying "conceptions" of the distinction involved in "qualitative differences in learning" have been identified in the paragraph above based on Biggs' argument:

1. students could be categorised as deep or surface learners
2. students have predilections towards deep or surface approaches that adapt to changing conditions and can therefore be circumvented
3. students may adopt a deep or surface approach to a learning task depending on how they focus on the requirements of that task.

Scare quotes have been used round "conceptions" to indicate that these may only be apparent, because they have been inferred from what people have written. They are not permanently "held" conceptions (if such a statement is meaningful). Some

evidence for making such inference is considered in Figure 2.1 and elaborated below.

The different conceptions may be associated with different objects of study and units for analysis: it is important to determine whether what is being considered is *an attribute of the student, the task given to the student, what the student actually does, variation between what students do, the context, an outcome, variation in outcomes, how the student responds to the discourse of the situation* – or a combination or relationship between these. All of these might be variously attributable to the three conceptions and this highlights the importance of being clear about what is being “measured” or described, a point that has also been made by Biggs (1993).

Conception of deep/surface distinction	Illustrative comments
1. students could be categorised as deep or surface learners	<p>Probably the most widely accepted [conception of learning styles] and best validated is Marton and Säljö's ... deep processors" vs. "surface processors" (McKeachie, 1995)</p> <p>...I realised just how difficult it was to categorise the students into the classifications and how complex the conceptions of learning are. However, I did classify one student as a deep learner..., two students as achievers..., two students as surface learners...</p> <p>(Chapple, 1999)</p>
2. students have predilections towards deep or surface approaches that adapt to changing conditions and can therefore be circumvented	<p>Thus, do not think that Robert is irredeemably cursed with a surface approach. What we know is that <i>under current conditions of teaching</i> he chooses to use a surface approach.... The conclusion that in Robert we have an incurably surface student on our hands might in the end prove to be correct, but that conclusion is way down the track yet.</p> <p>(Biggs, 1999:14-15, emphasis in original)</p> <p>Adjusting the context to afford changes in students' perceptions may be an important strategy in improving learning. Differences in these perceptions may relate to differences in approaches to learning. Melissa describes her experience of mathematics teaching as the encouragement of group discussion to help students explore what other students may be thinking. Antony believes that the assessment can be completed using rehearsal, memorization and recall and his approach is geared to that end.</p> <p>(Prosser and Trigwell, 1999:4)</p>
3. students may adopt a deep or surface approach to a learning task depending on how they focus on the requirements of that task	<p>An approach is not something inside a student. It is dynamic: it has the idea of change tied up in it: it only has meaning with reference to a situation and to certain types of content.</p> <p>(Ramsden, 1987: 276)</p> <p>It is always salutary... to try to pigeonhole oneself in one of these categories – do you think you are achievement-oriented rather than meaning-oriented, or vice versa? The idea has a certain face validity when applied to other people, preferably people you don't know very well, but applying it to oneself illuminates the crudity of the classification. There is a strong temptation to respond "both", or "it all depends". That is probably closer to the reality.</p> <p>(Laurillard, 2002:27)</p>

Figure 2.1: Three conceptions of the deep/surface distinction

1. Deep and surface learners

In the first conception described in Figure 2.1, there is no compunction about “labelling” students. The attribution might be supported by observation of behaviour or responses to questionnaires – or quite possibly a mixture of both. In providing categories of students (as opposed to categories of what students do), the writers establish their labelling as unproblematic and apparently rooted in research. Such classification may not be an easy task, as Chapple (1999) suggests, but it seems to be thought worth doing. It is useful to know what type of students are in your classroom, and in such a conception, this might be the unit for analysis. This conception is, however, apparently at odds with that of the writers of its own source of data (Marton and Säljö, 1976a; 1976b).

Such change in meaning for the content of a text based on the readers' interpretations, while still drawing on the authority of the original writers, provides a clear demonstration of the Bakhtinian notion of “dialogic discourse” (Bakhtin, 1994): that is, meanings and understandings always involve both the person who makes the utterance or writes the text and the one who interprets it. (This, of course, applies to students engaging with academic texts as much as to research-writers.) In this case, there is the additional issue of the authoritative nature of the discourse, highlighted through the fact that the 1976 work by Marton and Säljö is “said to be the most cited in the educational research literature” (Biggs, 1999:31). McKeachie's (1995) “deep processors” are not Marton's and Säljö's as he claims; nevertheless, the “dialogic overtones” (Bakhtin, 1994) from their frequently cited work are definitely present.

Bakhtin's ideas about dialogic discourse and authoritative discourse will be discussed in more detail in Section 2.2 below.

As well as doubts about the validity of the conception (though it is easy to see why the labels emerged), there is an additional problem to consider when the students become familiar with the labels, as many now are. Concerns might relate to self-fulfilling prophecies or the tendency to claim a “deep” conception when actually a surface one is being employed (the distinction between espoused theory and theory-in-use, as discussed by Argyris and Schön (1974)). An insider perspective might throw some further light on both of these types of concern.

2. Deep and surface predilections

In each of the books cited under the second heading in Figure 2.1 (Biggs, 1999; Prosser and Trigwell, 1999), the authors begin with an example of two students attending the same class but responding to it in very different ways. Their purpose in doing this is to suggest that the conditions can be altered to encourage a different response from the “weaker” student who has a predilection towards a surface approach. The unit for analysis is therefore the variation of attributed characteristics of students and there is an interest in the outcome associated with the characteristics.

In ascribing predilections to students, researchers have to rely on their own judgements based on how the students behave or report their conceptions and approaches. This is very different from the simpler statement that there are different ways of conceptualising or responding to a situation. There is also a tendency to relate these judgements to a set of values: for example, the student adopts a deep

approach, a deep approach is good and is associated with good outcomes. If a student displays a “bad” predilection such as surface learning, then the environment should be adjusted accordingly. This is an oversimplification of the case, but its appeal is clear as a potential source of practical advice for the classroom.

It is generally admitted, however, that while it is fairly easy to adjust a situation to “encourage” a surface approach, the more desirable deep approach can be much harder to stimulate. Indeed, sometimes interventions have the opposite effect to that intended, and the attempt to engineer a deep approach can result in a surface one (Ramsden, 1987; Trigwell and Prosser, 1991; Marton and Säljö, 1997; Biggs, 1999).

There has also been some criticism of phenomenography for its dependence on the judgement of the researchers to categorise and classify other people's conceptions (for example, Hasselgren and Beach, 1994; Säljö, 1994; Webb, 1997). All of these writers comment on the apparent lack of awareness among phenomenographers of the relationship between the production of such discourse and the norms that the researchers themselves hold. Säljö, for example, points to the problems of a one-sided interpretation of dialogue and particularly in a relationship when there is inequality in terms of power, such as a student and academic researcher:

It is not up to one individual alone to decide what is being talked about, and extreme caution is therefore necessary before one individual starts making statements about what an interlocutor is talking about. The phenomenographic belief sometimes uncritically allows for the definition

of the situation by the dominant party – the interviewer – to stand unchallenged and problematic.

(Säljö, 1994:3 Internet version)

Säljö acknowledges that not all phenomenographic studies can be criticised in such a way, citing papers that pose problems or refer to shared topics of discourse, where it is more likely that joint understandings are reached. He is not therefore suggesting that we can never make inferences about other people and their intentions; indeed, we do this as a matter of course when we talk to people. When the activity is not a collaborative one, however, and there is no shared motive or obvious context for the meanings that are being brought out, then it is necessary to be cautious. (The notion of collaborative activity is significant for the current study and is taken up in Section 2.2 below.)

Although the second conception of the deep/surface distinction does not change the original focus to the extent that the first one does – and the authors cited take particular pains to point out that they are not labelling students – it can result in the researcher who holds it making a “definition of the situation”. An insider's perspective on her own “predilections” might well result in a different assessment of that same situation because more information is known, and the insider may be more willing to provide it (as long as the circumstances are conducive to such honesty).

3. Deep and surface focuses

The third interpretation in Figure 2.1 is closest to that from Marton and Säljö's original study in 1976. The examples of comments given in Figure 2.1 highlight the view that approach to study is not an attribute of individual students. It is inseparable from the context in which the students find themselves. The only observation about the student that can be made relates to what the student is doing or saying at that time, how they respond to this particular set of circumstances. It is that "doing" that is associated with the outcome, not some entity within the student, although there is internalised (i.e. mental) action, including intention, as part of this process. The description does not depend on a state or "thing" that the researcher has to postulate – simply on the action as reported by the student. This conception would therefore be less susceptible to the criticism about researcher judgement above.

The two authors cited in Figure 2.1 (3) use findings from phenomenography to consider a holistic picture of the teaching and learning process. Ramsden (1987), in making a case for a relational perspective, stresses the need to inquire about students' perceptions of the educational demands on them. Laurillard (2002) uses phenomenographic data to consider how teachers, students and subject matter should interact in a "conversational framework". In both cases, they make recommendations for actual practice; the insider perspective on student experience could provide useful data that would fit into their holistic models of teaching and learning.

The third conception can still be seen, in different ways, in the work of the original authors and in both cases their work has potential relevance for the current study. As has already been demonstrated, Säljö's more recent work continues to highlight the primacy of discourse when discussing conceptual knowledge (Säljö, 1999). He belongs to the sociocultural theorists rather than the phenomenographers, an affiliation that is highlighted in the following statement:

Rather than asking how individuals acquire concepts with some specific, predetermined properties, the fundamental issue now becomes one of understanding how individuals are able to identify the situationally appropriate referential meaning of a concept or, alternatively, what it takes to use a concept in a relevant manner within a particular discursive practice.

(Säljö, 1997a:10)

In terms of how a group of students goes about undertaking a task such as reading a piece of text and answering questions on it, Säljö would say that this depends on the students' interpretation of that particular discourse practice and whether they are able to use appropriate concepts in relation to it. He makes such an observation in the second edition of a book on the phenomenographic research approach *The Experience of Learning* (edited by Marton et al):

When a text is defined as an object of learning this seems to affect how it is made sense of, and prominence is given to *criteria of relevance* which are not those adhered to in other reading situations.

(Säljö, 1997b:103, emphasis in original)

This is why Säljö has problems with the interview situation as a source of general statements about the conceptions a student “holds”. The situation itself determines how sense is made of the task or request for the student.

While Säljö takes us back to a focus on the content and context of the discourse, Marton's later preoccupation is again with process. He has shifted his emphasis from *variation in experience* to *discernment* as a function of variation (Marton and Säljö, 1997); (Marton and Pang, 1999). This is (according to Pang, 2003) partly in response to Säljö's (1994) observations on the lack of a theoretical foundation in phenomenographic work. There is still a suggestion about focus on the requirement of the learning task – on whether students consider the “sign” or the “signified” – when Marton says:

learning to see something in a certain way amounts to discerning certain critical features of that phenomenon and focusing on them simultaneously.

(Marton, 1999: 21, Internet version)

Again anticipating the sociocultural perspective in Section 2.2 below, it is interesting to compare this observation with one of Vygotsky's:

What is contained simultaneously in thought unfolds sequentially in speech.

(Vygotsky, 1934/1987:281, emphasis in original)

It will be useful to investigate, from the “insider” perspective, what is simultaneously being discerned or explored when a student simply parrots a single word or phrase to describe a phenomenon. There are observations on this situation in the findings in Chapters 4 to 6. Both Marton and Vygotsky would recognise the situation, describing it in terms of surface processing and imitation respectively. It will also be useful to identify the difference when the student moves on from such imitation to appropriate the discourse for herself.

In some such cases, the apparent outcome might look the same – that is a parroted account of a phenomenon might appear the same as an appropriated account. We do make inferences within our contexts about the students' actual outcomes and this is a recurring theme in the current study.

2.1.3 The Role of Learning Outcomes

As shown in the review of phenomenography that introduced the previous subsection, the word “outcome” is important in phenomenography. It also features in the current study (see Glossary). The use of the word is significant, as there have been moves in recent years in educational institutions to attempt to control outcomes, by specifying in advance what they should be.

Biggs is particularly associated with work on learning outcomes. He defines these as “actual responses ...to specific learning tasks” (Biggs and Collis, 1982). He uses a taxonomy of outcomes to support his efforts to encourage a deep approach and as a framework to support development appropriate for different levels (Biggs, 1999). Figure 2.2 shows the levels of Biggs' Structure of the Observed Learning Outcome (SOLO) taxonomy.

Level of response	Description of student actions
Prestructural	Misses the point of the task or provides a tautological answer (e.g. repeating the question).
Unistructural	Concentrates on one relevant aspect of the task only and closes on that; does a simple procedure.
Multistructural	Selects more than one aspect but does not relate them; lists relevant information but does not make connections.
Relational	Integrates data; and applies concepts to task.
Extended abstract	Uses the given principle to handle unseen problems; goes beyond existing principles.

Figure 2.2: The SOLO taxonomy

(adapted from Biggs and Collis, 1982; Biggs, 1999)

Apart from the first one, which will be inadequate for any tertiary level task, these can be seen as levels of response that increase in complexity as the student's understanding develops. It may well be that at some stages of a course of study only

the unistructural level of response is required; however, more advanced students will be expected to be further up the hierarchy. (There is certainly a suggestion that a unistructural response is generally too “surface”.) The taxonomy thus presents a set of categories with which to evaluate outcomes and also to attempt to construct activities that lead to desired outcomes.

Each new piece of learning, throughout an individual's life, is subject to the concepts of SOLO in a process described as “learning cycles” (Biggs and Collis, 1982:214). This raises issues about developmental stages. Biggs' adherence to the second view about deep and surface learning identified in Figure 2.1 – that students have predilections towards deep or surface approaches – is consistent with claims about the status of the SOLO taxonomy with respect to stages of development that individuals might reach. Biggs and Collis postulate at the end of their book that:

patterns of cognitive abilities...and personality variables... might predispose individuals throughout adulthood to respond at unistructural, multistructural, or relational levels within particular modalities

(Biggs and Collis, 1982:235)

They see the potential here for strategies of intervention, and indeed this is what Biggs is attempting to do when using the SOLO taxonomy to support efforts to align objectives, teaching and learning activities and assessment tasks (Biggs, 1999; Biggs, 2003). The SOLO taxonomy thus shares with the deep/surface distinction a preference for outcomes that are higher up in a hierarchy.

Biggs' definition of "learning outcome" as a response to a learning task conforms to much other usage in writing about higher education issues and is the preferred definition for the current study. In higher education practice, however, the expression is also used to mean "anticipatory statement" and "unit of assessment" as will be demonstrated in later chapters and Appendix 2.

2.1.4 Implications of the discussion of phenomenography

The two ironies – loss of the original focus on discourse and the variations in conceptions about the deep/surface distinction – are representative of how a research specialism can develop and change over time. They are not therefore being put forward as a rejection of phenomenography; they are merely a vehicle for highlighting its stance towards students' relationship with discourse. The "conceptions" of the deep/surface distinction identified in Figure 2.1 are not stable; most of the dominant writers appear to shift between conceptions 2 and 3. While the original and much subsequent work emphasised variation, some researchers understandably wanted to use the same data and correlations to explore practical issues in the classroom such as identifying students at risk, a potential encouraged by reference to "outcomes". Most areas of research, including the sociocultural, will be subject to such differences in the way people talk and write about them. Indeed, it is one of the principles of sociocultural theory that such differences emerge, as will be explored in Section 2.2 below.

Although the lack of emphasis on discourse suggests that phenomenography will not be the main source of illumination for the current study, the review of the literature has been useful. The analysis above has identified as potential areas for further

study: (1) what the student was actually attempting to do at the time; (2) whether that outcome was really achieved. It would seem particularly appropriate to use an insider perspective to consider such questions; indeed it could be argued that knowledge about what is being attempted is *only* available to the person doing the attempting. Though inferences about students' intentions have to be made, at least for the purposes of assessment, only the student herself can be completely sure that the successful "action" was the one she was intending to do – even if she has difficulty in articulating that intention.

The analysis also highlights a warning about the need to be precise about objects of study and units for analysis. Some alternative recommended objects of study are considered below.

2.1.5 Alternatives to the deep/surface distinction

The deep/surface distinction is not the only paradigm for considering the student experience. Mann (2001) and Haggis (2003) suggest as alternatives, respectively, engagement/alienation, and an academic literacies approach. In their analyses, they each contrast their own focus with the deep/surface distinction and suggest that there may be different interpretations of what is going on in the situation.

Mann (2001) proposes that researchers should consider "a focus on alienated or engaged experiences of learning" and provides a helpful literature review of perspectives on the "alienated" side of this dichotomy. Mann's topics – and her recommended responses from higher education teachers – read very differently from those that emerge from the deep/surface/strategic camp. Drawing on sociocultural

themes including discourse, subject positioning, creativity, power relationships and identity, she provides an alternative explanation for students' use of "surface" approaches – their alienation from the group to which they are supposed to belong. Rather than adapting the curriculum to engineer a deeper approach, Mann recommends that teachers respond by providing students with solidarity, hospitality, safety, redistribution of power, and a criticality that leads to engagement (Mann, 2001:17).

Haggis (2003) also picks up on the theme of alienation when she proposes "academic literacies" as a possible "complementary alternative" to the "approaches to learning" research. She argues that the deep/surface model says more about academics and their values than it does about the students. She points out that it has taken years for academics to develop the complex understandings that they so value. Students have to find their own ways through this *because* the value system dictates that they should do so. Anything more explicit is frequently dismissed by academics and institutions as "spoonfeeding" – a view that will also be explored in the findings in Chapters 4 to 6 of this thesis. The deep/surface model does not explain the difficulties that a student taking a "surface" approach has in understanding how academic discourse operates in context. Haggis suggests that the role of this research in establishing a "normative paradigm" has led to elitist assumptions that are inappropriate for a 50 per cent participation rate in higher education.

The alternative perspective that Haggis proposes – academic literacies – highlights the complex relationships between academic task, context and power. She cites research that demonstrates the complexity of "learning" – that engagement with a

new genre entails several stages, some of which might be described (unhelpfully) by researchers or practitioners as “defective” (Francis and Hallam, 2000). In espousing academic literacies, she draws attention to Ivanic’s suggestion that there may be mismatches in purpose of academic literacy as defined by different participants: the academic community, the institution and the students themselves (Ivanic, 1998). The problem with the deep/surface distinction is that it reinforces academic norms while not taking into account the complexity of the issues and especially the influence of context. Like Mann (whom she also cites, suggesting that alienation may be associated with “unexplained norms and values”), Haggis concludes with a suggestion that higher education needs new ways of conceptualising its values that move away from an emphasis on performance that is based on an elitist norm, towards one on social justice.

There is an interesting paradox in part of the title of Haggis' paper: “Constructing Images of Ourselves?” From a researcher-practitioner perspective, this could allude to the reproduction of academic “types” that might be expected from an elite higher education culture where ways of being and learning are passed from the lecturer to the student. From a new student's perspective, on the other hand, it could refer to the need to construct an image of the self as an emerging academic in a particular discipline. So a question may be: “Who is or should be doing the constructing – the lecturer or the student?” Haggis' concern is that the features of the image may be clear to the “gatekeepers” of higher education, but not to its students (Haggis, 2003:102). It is difficult to know whether to proceed with the construction of an image of oneself when the implications are unknown. As Mann observes:

The student who stands on the edge of a discipline is an outsider who is faced with the decision of whether to join or not and at what cost.

(Mann, 2001:11)

A similar image is used by Ivanic in her analysis of academic literacy practices when she describes a particular student as: “teetering on the edge of an identity as a member of an academic community” (Ivanic, 1998: 156). In this case, the features of the image of the “new” self are becoming more apparent: the student is beginning to use the discourse practices that position her as a member of a particular community. The recognition that this is what is happening is shared between the “co-researchers” – Ivanic and the student herself – in an approach to describing student experience that allows the researchers to check out their jointly constructed understandings of what is happening when a student writes in a particular way.

None of these writers is making a case for reduction of standards, “dumbing down” or spoonfeeding; they seek rather to provide alternative descriptions of student experience that will lead to responses to students that are based on their needs as people and that will allow them to understand the communities they are joining. There is a political aspect to their writing; both in their challenges to a dominant paradigm, which lead the authors to question the core values of academe, and in their alternatives, which involve a redistribution of power and a closer attention to the actual situation of students. The authors' positions have implications for a wider community than the higher education classroom. This is not surprising, as they draw their inspiration from postmodern, sociocultural and academic literacies sources which theorise education as a method of passing on, responding to, developing and

ultimately even challenging the culture of a society – a stance that inevitably raises political, ethical and ideological issues.

The present study also seeks to provide an alternative description of the student experience, and its “insider” nature will in the process draw out aspects of the context that may be invisible to an external researcher. It attempts to provide further information on the “engaged” as well as “alienated” description of Mann's analysis; it aims to fill out some of the aspects of context that Haggis suggests are required and to provide further insights on Ivanic's ideas about identity in an academic community. Although its focus is broader than student writing, it does draw on the analyses of writers concerned with academic literacies and shares the view that the same data can “constitute a different kind of evidence” (Lea and Street, 2000) if considered from such a different perspective. In this particular case, the argument is that data that might be used in a phenomenographic account will constitute a different kind of evidence if viewed directly from a student's perspective.

The above critique of the phenomenographic approach's attitude to discourse suggests a need for a description of student experience with the following attributes: it should take account of the discursive context from which it is itself derived; it should provide insights on the topic and its context that might otherwise be invisible; it should offer suggestions to support or refute inferences that might be made by an external observer.

The requirements identified above point to the need for a “thick description” of the student experience: a phrase popularised by Clifford Geertz (1973) to explain the

function of ethnography in eliciting all the relevant information about a situation where people are being studied. Because this idea is essential to the current study, a brief explanation of it follows, interspersed with observations on its implications for the ideas from phenomenographic research already encountered.

2.1.6 Phenomenography and the need for a “thick description”

A “thick description” provides enough information to enable an observer to distinguish a deed from another apparently identical one. An example to illustrate this comes from the philosopher Gilbert Ryle (1968) from whom Geertz also borrowed the expression “thick description”. The two deeds that appear to be identical are one boy’s wink and another’s involuntary twitch of the eye. These indeed would be considered identical if only a “thin” description were used (that is, “a contraction of the right eyelid”). In Ryle's essay, he further draws attention to other things that could be happening: the winker might be parodying another boy's poor attempt to wink but the “thin” description would remain the same. The thick description might even be that he is practising that parody before delivering it to his friends. To be able to say this, it is necessary to know about the meanings of winks, parodies and rehearsals, all of which are socially-constructed practices. It is also necessary to have sufficient information about the context present to attribute the contraction of the eyelid to a particular practice and its associated meanings.

Ryle uses this example to highlight why certain verbs cannot function at the thinnest level of description – to parody is not an action that can be achieved separately from its context. The action involved in contracting an eyelid requires a thicker description for the observer to know that it is a parody.

Similarly, there will be a thin and thick description of a student responding to a task in a classroom. For the thick description, information is needed not only on the observable aspect of the action but also on the intentions of the student, the context of the task and our understandings of what a response to that task might mean. Just as we can make inferences about whether an action is, say, a rehearsal for a parody of a wink, we can make similar inferences about an attempt to discern meaning from a text. A phenomenographer draws evidence from an interview to say that through the action of reading a student intends to discern meaning; the student herself may know that this description is not quite accurate – she will know, for example, if her intention is better described as “to respond appropriately to the reading in a way that will impress the interviewer”. (This may, of course, include *claiming* to be intending to discern meaning.) She may have several intentions.

Ryle draws attention to the significance of criteria for success or failure of the action: for a parody to be successful it has to meet the criteria for being a parody and also those for being the action it is parodying, in this case winking. The thick description entails an action that could be qualified by a number of clauses, each one having to be fulfilled for success. However, they do not each represent a different action: the boy is not separately imitating and communicating a conspiracy – there is one action in parodying a wink.

There is (arguably) one visible action in following text in a book, but the whole notion of “reading” is already a much more complex example than the ideas in the

winking/parodying example, even before considering taking a “deep” or “surface” approach to reading.

Similarly, there is one apparent action in telling a phenomenographic researcher what the intention behind reading was; but that “telling” could be qualified by clauses that indicate intention to: say what is expected, impress, pretend, reflect honestly etc.

The requirement for “thick descriptions”, taken up enthusiastically by Clifford Geertz and used to good effect in his “Notes on the Balinese Cockfight” (Geertz, 1973), has become a principle for much qualitative research, particularly research that might be labelled naturalistic or ethnographic (Cohen, Manion and Morrison, 2000). As well as having implications for the method used here (see Chapter 3), Ryle's paper anticipates a feature of the sociocultural approach described below. The notion of discourse as action is invoked during the explication of the main object of Ryle's paper – to say what “le penseur” (Rodin's thinker) is doing. There are both a wide range of potential thick descriptions of le penseur's actions and a complexity of issues associated with the action of original thinking. A person sitting in le penseur's pose might, Ryle suggests, be counting vehicles, listening to a band, reviewing a familiar poem or tune, composing a tune or poem, sketching, planning a chess move, running through the alphabet backwards (for the first time), each involving a different type of mental process. When it comes to a thick description of an original thinker, this will include, *inter alia*:

trying, by success/failure tests, to find out whether or not the things that he is saying [to himself] would or would not be utilisable as leads or pointers.

(Ryle, 1968: 9, Internet version)

The above analysis raises a number of questions about what students may actually be doing when a phenomenographer infers that they “attempt to discern meaning from a text”. How do students do this, what do they need to enable them to do this, what procedures do they follow? To be fair, the phenomenographers are not asking these questions; their interest is in variation of approach. However, the questions raised by the idea of a “thick description” suggest that the categories that emerge from phenomenographic studies may underestimate the complexities underlying the thin descriptions of actions in higher education. The items in the “outcome space” may themselves consist of descriptions that are too thin, or indeed too thick without any justification. Rodin’s thinker might prove to be a vehicle counter after all.

The insider approach will therefore attempt to provide or justify thicker descriptions of actions than those elicited by phenomenography. The emphasis on “action” involving intention and the sociocultural context will be elaborated in the next section.

2.2 A sociocultural view of the experience of discourse in higher education

In the critique of phenomenography above, sociocultural sources were drawn on to offer alternative explanations to the deep/surface dichotomy. This section of the chapter considers the features of the sociocultural context that will be relevant for forming a “thick description” of students' experience of discourse. The description must not be excessively thick; the findings will have a “complex specificness” (Geertz, 1973:23). The specific nature of the present research is to discover the relationship between students and the discourses they encounter when they engage in a new programme of study – and what the students actually do in terms of these discourses. The thick descriptions will thus particularly relate to what was described at the beginning of the chapter as “discourse practices” – those actions that create and sustain the discourse.

One particular key player is highlighted: Lev Vygotsky, “founding father of sociocultural research” (Mercer, 2002). A brief review of some relevant aspects of Vygotsky's work, and that of his followers, draws out additional themes for a framework for considering an insider perspective on students' relationship with discourse.

Sociocultural theory focuses on practice, meaning, mediation, discourse and social interaction (Claxton, 2002; Säljö, 2003). The term is used here as an umbrella for a number of perspectives that draw on this list of themes. A variety of other terms

might be preferred by the associated authors because of their specific focus and/or units for analysis, for example: **situated learning** (Lave and Wenger, 1991); **mediated action** (Wertsch, 1991); **activity theory** (Leont'ev, 1981a; Engeström, 2001); **cultural-historical activity theory (CHAT)** (Wells and Claxton, 2002). While the current study draws on these perspectives, it is important that it adheres to its own principal units for analysis, namely **what a student notices in response to discourse**, and the **actions** associated with this. This issue of units for analysis – also associated with the “thick descriptions” identified as necessary in the last section – is taken up again in Chapter 3. As well as being justified by the need for a thick description, the link between what a student notices and actions draws on themes from activity theory – a link that is introduced here and developed in Chapter 3.

The theme of discourse in relation to education has already been a major focus for sociocultural research and analysis, particularly in schools (Edwards and Mercer, 1987; Engeström, 1987; Lemke, 1989; Mercer, 1995; Säljö and Bergqvist, 1997) but also in universities (Ivanic, 1998; Lea and Stierer, 2000; Lillis, 2001; Northedge, 2002). The emphasis in such studies tends to be on the use of sociocultural insights (and, more specifically, those focused on academic literacies) to explain what is going on and why some activities in classrooms might work better than others. They demonstrate how students have to become familiar with discourse practices that have become second-nature to their teachers, to the extent that they may not even recognise them as socially constructed.

These difficulties in appropriating the discourse can often be associated with artefacts; for example, Säljö and Bergqvist (1997) show how technology in a lab

incorporates perspectives on a subject of study that originate in historical discourses, in this case on the properties of light. The use of such artefacts, the authors argue, depends on a socioculturally-developed understanding of a particular topic and principles. If the students have not been exposed to this already, then the observations that are “natural” to the teachers will not be so to the students. The properties of light are not just “out there” to be seen, but depend on interpretations, calculations and concepts jointly constructed by scientists over a period of time. The example of students facing difficulties with their first exposure to these concepts resonates with my own experience in a lab and I return to it in Chapter 7.

Some sections of the sociocultural theory umbrella might be shared by writers whose main emphasis puts them in another tradition. This includes writers on discourse such as Fairclough (1989; 1992; 1995) whose work on **critical discourse analysis** also emphasises practice, meaning, mediation, discourse and social interaction (the list already identified above for sociocultural theory), particularly where discourse is used to sustain power and control and to determine and promote cultural “norms”. These themes can be found too in the work of Bernstein, who describes **pedagogic discourse** as “framing”, which highlights the way meanings are mediated and controlled by teachers in a classroom setting (Bernstein, 1975; 1990; 1996). Bernstein's notion of linguistic “**codes**” – **elaborate and restricted** – that ensure the continuity of educational inequality has been particularly influential, and also controversial because of some interpretations of its intentions. Bernstein's sense of code also influenced Halliday, whose work on language as a **functional “system”** (Halliday, 1994a) also has implications for learning; he sees language as a human-made system providing a context in which a child will “learn to mean”. A code, in

Bernstein's sense, acts as a filter on these meanings for the child, "defining and making accessible the semiotic principles of his own subculture" (Halliday, 1994a:27). Wells (1999) points to the complementarity of Halliday's work with Vygotsky's, particularly with respect to semiotic mediation, collaborative activity and individual and sociocultural change. (Wells, 1999:48)

Fairclough, Halliday and Bernstein, who might be associated more with discourse *per se*, overlap sufficiently with the sociocultural perspective for their work to be considered in the arguments here. However, the major focus is on responses to discourse rather than an analysis of the discourse itself, so that references to these writers tend to be contingent rather than extensive.

The sociocultural influences and the work on discourse particularly coincide in work on **academic literacies**, as has already been seen in reference to work on student writing (Ivanic, 1998; Lea and Stierer, 2000; Ivanic, 2001; Lillis, 2001). The current study extends this focus to include responses to spoken as well as written discourse practices.

2.2.1 A brief review of Vygotsky's theory of development

A common feature of the sociocultural writers identified above is that they acknowledge a debt to Lev Vygotsky (1896-1934). Vygotsky's premature death and the lack of available translations of his work delayed the interest in his ideas until towards the last third of the twentieth century since when there have been numerous developments of those ideas, especially with respect to education. The extensions of his ideas have taken them in several directions; a brief review of some relevant

features of this process will serve to highlight my own direction for the “insider” perspective.

Vygotsky's theory about the social origins of higher mental functions led to his making links between individual minds and the development of social systems, with the latter predominating. Vygotsky's principal unit for analysis is word meaning – the “unity” of speech and thinking (Vygotsky, 1934/1987:51). He sees word meaning as composed inseparably of speech and thinking in the way that water is composed of hydrogen and oxygen. Word meaning inevitably features in an analysis of a student's exposure to and engagement with a new discourse: the expansion of this notion, below, provides some additional resources for that analysis.

Vygotsky identifies the distinctive nature of higher intellectual processes in human beings as a result of the use of signs (particularly words) as mediating tools, contrasting this with the “lower”, instinctive, responses although they may be related.

At a higher level of development, however, mediated relations among people emerge. The essential feature of these relations is the sign, which aids in establishing this social interaction. It goes without saying that the higher form of social interaction, mediated by the sign, grows from natural forms of direct social interaction, yet is distinguished from it in an essential way.

(Vygotsky, 1981a:160)

Vygotsky's idea of mediated relations, has been represented diagrammatically as follows:

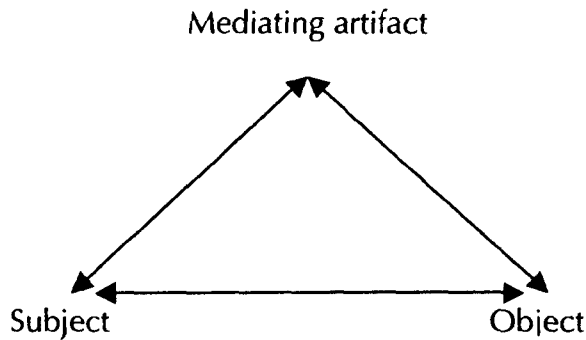


Figure 2.3: Reformulation of Vygotsky's view of mediated action

Source: Centre for Activity Theory and Developmental Work Research,
<http://www.edu.helsinki.fi/activity/pages/chatanddwr/chat/>

Engeström (1999) describes this model as belonging to the first generation of activity theory (his expansion of this model is considered later in Subsection 2.2.4 and even further in Chapter 7). There are various versions of the model, some for instance using "tool" rather than artefact (Daniels, 2001:14). Tools and artefacts are both of interest to the current study, but the idea of tool is particularly applicable at the initial stage of description following Vygotsky's ideas of the sign as a tool for development of higher intellectual processes. His subject is the child, his tool/mediating artefact is the sign, and his object is what the child is attempting to do. This relationship can also be seen in the current study, though the subject is an adult student and the object is the academic study of mechanical engineering, or a specific aspect of it.

The sign – and especially the word – is significant in the history of an individual's development (ontogenesis). Thus, to use Vygotsky's own example of a gesture for indication, its first appearance comes from a baby's (instinctive) unsuccessful grasp; when this results in a response from a mother the movement changes to a social one; eventually the child becomes conscious of the significance of the gesture. The development of the sign thus moves from situation, via other people's response, to individual consciousness.

As the child learns language, this relationship persists. Thus word meaning, Vygotsky's unity of speech and thinking, mediates social interaction and has itself grown from social interaction. This view has resulted in one of Vygotsky's most famous statements:

We could formulate the general genetic law of cultural development as follows: Any function in the child's cultural development appears twice, or on two planes. First it appears on the social plane, and then on the psychological plane. First it appears between people as an interpsychological category and then within the child as an intrapsychological category.

(Vygotsky, 1981a:163)

The present study refers to adults' experience rather than that of children. While much of Vygotsky's work relates to development in children, the role of word meaning as the unit for analysis suggests that the developmental process should also be observable in adults who are appropriating new meanings. The difference is that

the adult has already been through a process of instruction that has resulted in the maturity of some scientific concepts, as described briefly below.

Word meaning evolves into concepts – generalisations that can be used in a variety of circumstances – which might be everyday or “scientific”. Everyday concepts are learned spontaneously and non-systematically; scientific concepts are learned through a system and through instruction, perhaps at an institution such as a school. (This is a broad use of the term “scientific”, including systematised concepts from all academic disciplines.) Both everyday and scientific concepts develop through the social and psychological processes and there are also interactions between them. For example, instruction in scientific concepts depends on the child's having developed everyday concepts; in turn everyday concepts are restructured once the child has developed scientific ones.

Some important Vygotskian constructs emerge from this interplay between the social and the psychological, through the mediation of signs. One is the genetic nature of psychology – that is, its development includes not only the ontogenesis (the history of individual development) but also phylogenesis (the history of development of the species). Thus, because of its history, the human species has evolved a number of signs and artefacts, steeped in meanings that are passed from one generation to another. The equipment in an optics lab, already mentioned, exemplifies an artefact where such meanings are embodied. The embodied meanings may not be apparent to the newcomer, however, and this will be explored later from the insider perspective.

Another related construct is the Zone of Proximal Development (ZPD) – the difference between children's actual development and their immediate potential development. Actual development relates to what can be achieved independently: potential development relates to achievements that are supported by adult or peer guidance. The meanings from current and previous human interactions can only be passed on when the child is ready to receive them. The ZPD has been invoked in a number of studies of learning, including some relating to adults (for example, Engeström, Brown, Christopher *et al.*, 1997).

From Vygotsky's perspective, formal instruction is a key part of a person's development – in fact, he identifies this as the distinguishing feature of the human being. This has to happen deliberately and systematically, because scientific concepts demand levels of abstraction that must be mediated by signs that involve meanings and other people. Educational institutions have evolved to satisfy this need.

As with the deep/surface distinction in phenomenography, there are several interpretations of Vygotskian concepts. These tend to relate to where the writer places the emphasis: for example, on individual cognition, on mediation, on the cultural context, or on change in society. Writers whose work originates in Vygotskian theory are thus faced with accounting for interactions between individuals, specific communities and society as a whole. It is perhaps not surprising that some of Vygotsky's successors favour interactions in different aspects of these three levels. Thus Wertsch (1991) is particularly associated with the mediating role of language, Mercer (2000) with jointly produced knowledge and Engeström

(Engeström, Engeström and Suntuio, 2002) with collective activity. Their positions are not necessarily mutually exclusive, but they do lead to different emphases in research, with potentially different implications. Thus while Mercer does draw on the way a school is steeped in culture, his focus is on how discourse can be used to support students in school. Engeström, on the other hand, while recognising the role of individuals' actions and cognition, is more concerned with how whole systems can be transformed through collaborative and collective efforts at change. These different focuses result in use of different methods for both research and practice; but Mercer and Engeström share a practical orientation that encourages them to engage with participants in making the discourse practices and other actions explicit, whether these participants are schoolchildren (Mercer, 2002) or a team of legal workers (Engeström, Brown, Christopher *et al.*, 1997).

The following subsection is an attempt to position the current study in individual, cultural and social levels of analysis, identifying issues raised by these levels for the method to be used in the study.

2.2.2 Students' responses to discourse: a metaphor of place

For a student approaching a new discipline, the discourses she encounters will relate to both the practices of that discipline and the practices of the classroom in which the discipline is mediated. The classroom belongs to an institution, which is itself "the repository of...many discourses urged on it by the wider society" (Barnett, 1997:36). The current study relates to two such institutions – a further education college and a post-1992 university. A sociocultural perspective takes account of all of these "layers" of context: thus disciplinary knowledge is constituted by and in turn

constitutes the discourses of practitioners, classrooms, institutions and the wider society. Viewed this way, all writers on academic discourse might be said to be giving an “insider” perspective; they all belong to wider society and probably to several of its institutions. Another way of looking at the current study is to describe it as the view from a person on the periphery of a discipline.

The metaphor of place and boundaries behind the idea of a student on the periphery can be found in a number of studies. These include: belonging to academic tribes and territories (Becher, 1989; Becher and Trowler, 2001); legitimate peripheral participation in communities of practice (Lave and Wenger, 1991); “becoming the village” (Lemke, 2002). The metaphor is also present in the contemporary discussions of “wider access” (access to non-traditional groups of students), “borderless education” (the use of e-learning to reach more and disparate groups of people) and in the whole idea of “gatekeepers” in education.

A new student, then, might be characterised as someone who is attempting to enter a disciplinary “territory”. The changing context referred to in Chapter 1 suggests an opening up of that territory – wider access and borderless education are providing more opportunities for entry. In the second edition of the seminal work *Academic Tribes and Territories* the authors note the major shifts in “topography” in the decade following the first edition, including the fact that disciplines themselves have changed – they have grown and fragmented and in some cases, they have declined or regrouped (Becher and Trowler, 2001:14-15). The territory may have opened up, but it has changed in the process, which will have implications for the students who

are attempting to enter it (not least of which will be a barrier to understanding what the territory actually is).

The focus of the work of Becher and Trowler is on the well-established participants in the academic tribes, some of whom will be the gatekeepers to the territory. For them, new recruits to the tribes are likely to be postgraduates. In the present study, the metaphor of territory is extended to those who are taking the first steps; they are not at the stage of being accepted into the tribe but they may be participating on its periphery. To do this, and to decide whether to step further into the territory, students need to be exposed to its discourses.

The idea of a “tribe” is useful because of its association with territory, which is itself a helpful way to characterise an academic discipline. Becher's work has clearly established that there are disciplinary differences in values, practices and discourse, and that these remain even when external forces (such as marketisation and globalisation) seem to attempt to homogenise academic life. What is different and distinctive about a discipline is an important aspect of learning, as has already been shown in the account of Marton's work on phenomenography as a study of variation – how students learn by discerning. A simpler way of putting this relationship for the current context is that the new student of mechanical engineering needs to know how to identify what is important for mechanical engineering and that this will involve her in a process of recognising its values, accepted practices and ways of talking (its discourse and genres).

Some writers refer to communities, rather than tribes and this construction emphasises what is going on *within* the group rather than what differentiates it from other groups. The ideas are related, however: Swales' (1990) notion of a discourse community – a distinctive group of people with shared goals and ways of communicating – has been an influence on Becher's work on tribes and territories. Writers about higher education have identified “specialist discourse communities” (Northedge, 2002:252), in which a student becomes “a functioning participant”. High level knowledge is constituted by the discourse of that specialist community; to access the knowledge the student must become engaged in the practices of that discourse and as Northedge points out, she will need an “organised excursion” to take her there.

The theme of a guide in the unknown territory can be discerned in a number of works, especially those by Mercer who sees the need for “guided construction of knowledge” (Mercer, 1995). The Vygotskian theme of the interpsychological nature of knowledge recurs throughout his work: from the “common knowledge” he and his co-author identified as being created through school lessons (Edwards and Mercer, 1987) through to a general conception that human beings use language to *think together* (Mercer, 2000). He also draws on the metaphor of place for this shared understanding, by characterising it as an Intermental Development Zone (IDZ):

a dynamic frame of reference which is reconstituted constantly as the dialogue continues, so enabling the teacher and learner to think together through the activity in which they are involved.

(Mercer, 2002:143)

The metaphor in the IDZ usefully highlights the involvement of both parties: guides on the excursions into specialised discourse communities must not end up talking to themselves. It also suggests that students should not be expected simply to “discover” everything for themselves, as approaches based on Piagetian theory have implied.

Participation in a community is central to the notion of situated learning (Brown, Collins and Duguid, 1989; Lave and Wenger, 1991). Their argument is that learning necessarily results from the activity, context and culture in which it takes place. Writers on situated learning raise questions about the role of educational institutions, which may not provide the appropriate activities, context and culture; for example:

Unfortunately, students are too often asked to use the tools of a discipline without being able to adopt its culture.

(Brown, Collins and Duguid, 1989:33)

Words and signs may be the major tools of the discipline (Vygotsky, 1934/1987), but for Brown, Collins and Duguid, the culture will not necessarily be transmitted along with the words in a classroom:

It is a mistake to think that important discourse in learning is always direct and declarative....They need to observe how practitioners at various levels behave and talk to get a sense of how expertise is manifest in conversation and other activities.

(Brown, Collins and Duguid, 1989:33)

This quotation makes a neat distinction between the discourse of a practice and the discourse of a mediated account of that practice, which might be termed “pedagogic” discourse. The learning in response to pedagogic discourse might not pick up on the learning inherent in other types of discourse practices, especially when the pedagogic discourse is “direct and declarative”.

Writers concerned with “situated learning” see learning as an “integral constituent” of engagement in social practice (Lave and Wenger, 1991:35). The metaphor of place recurs with the notion of “legitimate *peripheral* participation in a community of practice”. The influence of the Lave and Wenger monograph on situated learning has led some people to try to create “communities of practice”, as an internet search will confirm, with examples of sites “hosting” or “establishing” communities of practice. As the authors say themselves, however, “legitimate peripheral participation” is not put forward as a teaching technique; it is rather a perspective on learning. The communities happen anyway; they do not have to be created. However, knowledge of how they operate may assist in improving interventions.

To explain “legitimate peripheral participation” in simple terms: learning X entails being part of a community that is engaged in X, initially at the level of novice or apprentice. As the novices' expertise increases, their participation also increases up to the level where they might be regarded as full participants or even experts in X. So in order to learn X, a person needs to engage at some level in a community of practice. Conversely, a person who is in a community of practice is learning, and cannot help learning, about that practice.

Lave and Wenger explore the idea of legitimate peripheral participation in a community of practice through five examples: midwives, tailors, quartermasters, butchers and non-drinking alcoholics. None of their examples relates to a formal educational institution such as a school, which is deliberate because the authors feel that there the community of practice to which children are apprenticed is the community of schooled adults (and not, for example, the community of physicists). Following the perspective offered by Lave and Wenger, as a mechanical engineering student, I was a participant in a community in further education – with increasing expertise as I learned how to “do college” – rather than a person on the periphery of academic engineering.

The idea that I was simply “doing college” might concur with the suggestion above inferred from Becher (1989) that a student does not “join” an academic tribe until postgraduate level. However, it should be asked how this squares with Northedge's (2002) claim that even the undergraduate is a “functioning participant” in the specialist discourse community. “Doing college” still requires some relationship with the academic discourse, which is why Northedge organises excursions to the specialist discourse community.

The appropriateness of describing new undergraduates in relation to the “tribe” or community is likely to be disputed; Ivanic and colleagues (Ivanic, Clark and Rimmershaw, 2000) provide evidence from tutor feedback to students showing that:

different types of response reveal different beliefs about the role of a student in the academic community, ranging from being a fully-fledged member with authority and knowledge-making rights, to being on the margins, scarcely a member of the community at all.

(Ivanic, Clark and Rimmershaw, 2000)

The above illustrates the ideological and practical implications of what these issues might mean for an individual student. The student can be “positioned” in radically different ways with respect to an academic community – from being an individual learning *about* that community to becoming a participating member *of* the community. An insider’s perspective on varying responses to such positioning will provide insights about how higher education practices are accessed.

Another author who adopts the metaphor, Lemke, also considers place literally. He makes a case for conceptualising a community as a “village”, that is:

not just a collection of people: it is also a place, filled with culturally meaningful artifacts and with all the elements of a natural ecosystem, to which people also give meanings

(Lemke, 2002:36)

He believes that many of the activities of such complex communities cannot be learned simply through “legitimate peripheral participation”, but he does regard that participation as necessary. At an initial reading, he seems to be advocating formal education as an opportunity to reflect on participation in communities of practice.

However, educational institutions are not well equipped to do this, according to Lemke. While students do need to learn about the cultural meanings in their communities, they also need time and space to consider the experiences that give rise to such meanings. When the time and space are provided but dissociated from the experience (as in most educational institutions), then the result, Lemke suggests, is alienation from the curriculum. He uses the following example to stress the dissociation.

We teach students scientific and technical vocabulary, but we never point out how science systematically turns verbs into nouns and why it does so.

We rarely if ever explicitly teach students how to talk science.

(Lemke, 2002:42)

Lemke's plea for teaching science in a way that is meaningful and connects to students' experience of the world (see also Lemke, 1990), seems to relate to place in two different ways – figuratively and literally. While conceptualising a learning community as a village, he also draws our attention to what happens in actual villages and communities – groups of people with a physical location. This is also the case with situated learning, which makes a point of describing people in their actual physical locations. The artefacts and discourses that are present in those locations are steeped in meanings from previous times and even other places. This is true of a classroom or a college as much as it is of a house or a village.

Thus while “standing at the edge of a discipline” may be metaphorical, the student who is experiencing this is also experiencing an actual place and time and the

discourses associated with that. In the current analysis of students' experience of discourse, it therefore seems appropriate to attend to both the discourse of the discipline and the surrounding discourses that affect the student experience. This is more than just the acknowledgement of context that has already permeated this account; it entails a recognition that metaphor is itself a powerful tool (which is why Lemke has used it in the way he has). This is underlined by Kress who sees discourse as a "coloniser" of social territory:

Metaphorical activity occurs at sites of difference, in struggles over power, whenever there is a contention of an ideological kind, whenever an attempt is made to assimilate an event into one ideological system rather than another.

(Kress, 1989:71)

Kress is particularly interested in the "metaphorical activity" in relation to education:

Education is that social institution which is about the change and progression of its client members in the direction of mainstream culture, and into its classifications.

(Kress, 1989:95)

From Kress' perspective, the new student of mechanical engineering will be subject to change and progression in relation to the chosen culture. The discernment of variation – how her chosen academic "tribe" operates and how she changes in response to this discernment – will influence that progress.

For the new student, then, both literally and figuratively entering a new place, there will be discourses associated with the academic discipline, pedagogic guidance, the institution itself and the social world of a community of practice. All of these combine to form the interpersonal plane that must interact with the intrapersonal, through word meaning. Vygotsky describes this phenomenon as inner speech which “involves the evaporation of speech into thought” (Vygotsky, 1934/1987:280). A contemporary of Vygotsky's, Bakhtin, whose views are sometimes used to supplement Vygotsky's ideas on the sociocultural aspects of meaning (Wertsch, 1991) also made these connections but insisted on the dialogicality of inner speech:

... each person's inner world and thought has its stabilized *social audience* that comprises the environments in which reasons, motives, values and so on are fashioned ...

and, like many of the other sociocultural writers cited here adopts a metaphor of territory:

I give myself verbal shape from another's point of view, ultimately from the point of view of the community to which I belong. A word is territory *shared* by both addresser and addressees, by the speaker and his interlocutor.

(Bakhtin (1973) cited in Holquist, 1997: 395)

As Holquist observes, the territorial metaphor brings political associations and there are historical as well as linguistic reasons for this, though the latter is emphasised

here. In some cases, the territory of the word is, according to Bakhtin “authoritative”. He contrasts “authoritative discourse” with “internally persuasive discourse” (Bakhtin, 1981) which has an effect on how and how far the process of inner speech is “interanimated” (Wertsch, 1991:83). Authoritative discourse might include political, religious, moral and pedagogic uses, bound up with power and institutions. It either has to be accepted or rejected totally – along with the authority itself. Participation in educational institutions will inevitably highlight the distinction between authoritative and internally persuasive discourse and the distinction is thus significant for the present study.

Bakhtin's distinction between authoritative and internally persuasive discourse is also a consequence of the many “voices” that are present in any discursive situation.

All words have the 'taste' of a profession, a genre, a tendency, a party, a particular work, a particular person, a generation, an age group, the day and hour.

(Bakhtin, 1981)

The words that a student hears, says, reads and writes will reflect these many voices. A student's response to discourse – and to the practices of the discourses encountered – will be complex.

2.2.3 Sociocultural theory and the need for a “thick description”

Recalling the requirement for “thicker descriptions” of students' actions identified as a response to phenomenographic studies, it is now possible to outline some of the

sources affecting those descriptions. The thick description of a student's experience of discourse will need to reflect the effects of Bakhtin's different "voices" in the communities and territories that she enters. Thus this study will be concerned with all three of the levels that can be seen in Vygotsky's analysis – the individual, the social and the cultural. The analysis has identified the types of discourse that will be significant: *disciplinary, pedagogic, institutional and social*.

Following Ryle (1968), a thick description of responses to these discourses will entail an account of actions that includes information about the situation and the individual's mental processes. An insider perspective will be able to draw on the processes of internalisation identified by Vygotsky and Bakhtin, at least to the extent that a student can recognise and articulate her own motivation and intentions with respect to the actions and the (attempted or target) activities in which she is engaged. This invokes another thread of Vygotskian theory: activity theory.

2.2.4 Activity and action

In Ryle's (1968) examples of thin and thick descriptions, the emphasis is on what the person – whether a winker or a thinker – is actually doing. Ryle concludes his paper with the observation that a statesman inscribing the letters of his name on a piece of paper may be ending a war by his action. Whenever we speak, write, gesture, or use other semiotic devices, we are *doing* something that goes beyond the physical and observable action of speaking, writing etc. This notion can be found in philosophers who write about how we do things with words (Austin, 1962; Searle, 1969), anthropologists who identify the phatic nature of communication (Malinowski, 1994: originally 1923), linguists who consider language as a process of

turning experience into knowledge (Halliday, 1993), and in the sociocultural theorists influencing the current work. The idea is particularly associated with Leont'ev, a student and colleague of Vygotsky's .

Leont'ev (1981a) built on Vygotsky's foundational concepts of tool, mediation, operations, goal and motive to develop his analysis of activity. Leont'ev's account depends on three terms: activity, action, and operation. They are sometimes difficult to separate, as the same event might be regarded as one or other of them. But they do have different functions, sources and outcomes, as Figure 2.4 overleaf illustrates.

Level	Leont'ev's statements	Key issues and associations	Relationship to other terms
Activity	"humans' activity <u>assimilates the experience of humankind</u> " (Page 56)	This relates to Vygotsky's account of interpsychological and intrapsychological genesis of meaning. It depends on the notions of tool and mediation .	
	"In reality, we always deal with <u>specific</u> activities. Each of these activities answers to a specific need of the active agent. It moves toward the object of this need, and it terminates when it satisfies it." (P59)	Practical examples of activities are always associated with an object , always connected to a motive .	This is the practical counterpart of the theoretical concept of activity, described above. Like the abstract idea, it involves external and internal aspects.
Action	"We call a process an action when it is subordinated to the idea of achieving a result." (P59-60)	Actions are always associated with a conscious goal .	The action is energised by the motive or object of the activity .
	"the emergence of even the simplest technical division of labor necessarily leads to isolation of the separate partial results, which are achieved by the separate participants in the collective labor activity, but do not in and of themselves satisfy their needs." (P60)	The goal is affected by the social relations with others participating in the activity.	One action might be associated with a number of different activities and <i>vice versa</i> .
Operation	"Apart from its intentional aspect (<u>what</u> must be done), the action has its operational aspect (<u>how</u> it can be done)" (P63)	Operations are concerned with conditions .	If a subject is unable to carry out appropriate operations, the action cannot be achieved.
	"every operation is the result of the transformation of an action" (P64)	When an action can be done automatically, it becomes an operation of a more complex action. The ultimate phase of this " technicalisation " is that a machine undertakes the operation.	Even when a machine is involved, the relationship between operation and human action still holds. Thus machines and other artefacts still realise goal-directed actions .

Figure 2.4: Leont'ev's tristratal theory of activity
 (Adapted from Leont'ev, 1981: 58-65, underlining in original)

Leont'ev's main examples are both practical and material. He uses the example of changing gear in a car to highlight the difference between an **operation** and an **action**. When a person is learning to drive, changing gear is an action. Once it becomes something that the driver does without having a conscious goal, it is an operation – part of the conditions – and the action that the driver is engaged in is, for example, driving up an incline. Similarly, writing letters on a page is an action for a child starting school but becomes an operation for the university undergraduate whose action may be writing a paragraph in an essay.

Leont'ev's example of a hunt illustrates a collaborative **activity**, with food as an object, involving a division of labour. By making a weapon as a tool for hunting, an individual agent is performing an action. This does not directly result in food; subsequent use of the weapon either by that agent or by another person also contributes to the activity. The tool-making is part of a chain of contributory actions, whether the person acts alone or in collaboration. "In both cases, that which energized his/her activity and that toward which it was directed do not coincide." (Leont'ev, 1981a:60) The point is that division of labour *necessarily* separates the object from the energising source; human use of mediating tools (including language) also entails such separation.

Thus Vygotsky's notion of mediation can be brought into play to account for collaborative activity. However, the triangular representation of mediation shown in Figure 2.3 in the previous subsection will be inadequate for representing the complex relationships that emerge in activity theory. Engeström (1987) has proposed

an expansion of the triangle to take the social environment into account and to emphasise the interactions between the various parts of the system. In the process, he has highlighted the object of activity as an issue that is likely to require meaning-making or sense-making.

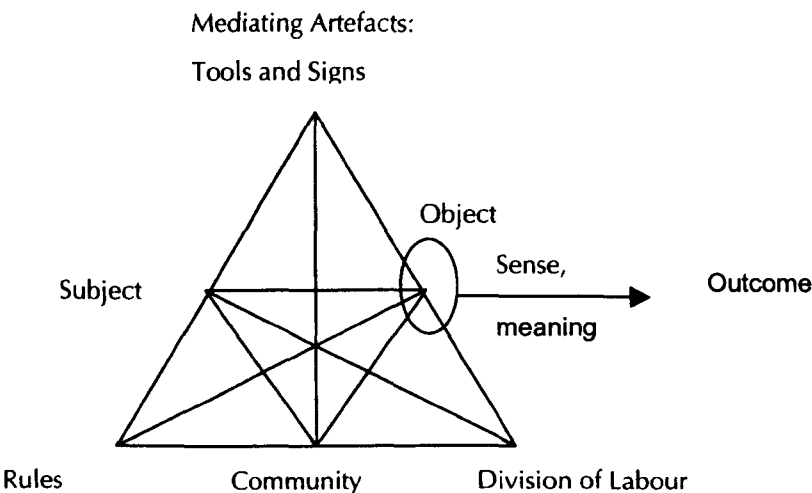


Figure 2.5: The structure of a human activity system (Engeström, 1987)

Engeström’s interest is at the macro level, particularly the potential for change that is associated with making sense of the object (Engeström, 1999).

While the motive for an activity may be a collective one, the division of labour leads to individual actions. Thus a goal is something that is attributed to an individual, even when energised by the shared motive. Leont’ev himself put forward the view that the process of goal formation was under-researched (Leont’ev, 1981a:62).

There is therefore a potential for research interest at different levels of Leont’ev’s theory: for example, the collective activity or an aspect of an individual’s internalisation (such as goal-formation) that is a part of it. Because the levels are

interrelated, it will be important for any researchers who use his theory to account for any implications or discrepancies relating to the strata which are not foregrounded in their work.

The analysis of Leont'ev's concept of activity into its three strata provides some reference points for my own definitions of activity, action and operation in the context of this current study. There are some difficulties with this, because of the everyday use of the words, especially the word "activity" in English in the context of education. Indeed, even some sociocultural writers who align themselves with activity theory have found it difficult to abandon the day-to-day use that particularly arises with respect to school education where the word usually means "a curricular component or event" (for example Wells, 1999:207; Carr, 2002:100). This is possibly less of an issue for research into tertiary level practice, yet the day-to-day use of "activity inevitably colours discussion of the issues.

An additional difficulty with the notion of activity is the need to determine motives in what individuals are doing in order to determine which activity is being studied. "Activity is what the researcher perceives as motivated." (Axel, 1997:140). What the researcher perceives as motivated will, however, be arguably more accurate when that researcher is simultaneously the student whose motives are being inferred. There is direct access to the internalised meanings, understandings and motivations that are of interest to researchers.

The theoretical problem of categorising something as an activity has its counterpart in real classroom settings. It can be seen in examples of student resistance to some

pedagogic approaches (“Why are we doing this?”) – suggesting that they do not recognise what they are doing as legitimate for the context. It can also be seen in the opposite of resistance, the “obedient purposelessness” (Perry, 1959) of students who do what they think is expected even though it does not seem to make sense. Examples of both these problems of identification with what is happening in the classroom can be seen in the findings of the current study. This seems to relate to students’ responses to what they think should be their *target* activities.

The fact that students themselves can have problems with what it is appropriate to do contributes to a sharpening of the definition of “activity” for current purposes. The main activity in which my fellow students and I were engaged might be described as “tertiary level education” or “learning mechanical engineering” – there are a number of possible descriptions. The responses of resistance or obedient purposeless are both motivated or energised by this same activity, though they may result in very different actions. So these responses are subordinate to the main activity.

How the main activity is classified varies according to convenience (Leont'ev, 1981a:59); what is more important in distinguishing activities is the object of that activity. The object of tertiary level education might be contested (and frequently is; for example is it personal development or employability?) It perhaps becomes clearer when the object is defined as “an HNC in Mechanical Engineering”. There the object is clear – a qualification and its certification (a distinction which raises its own questions). Making this the activity, however, then identifies the university

module as a separate activity and motivated by a separate object and it is perhaps useful to consider such a classification.

The “activity” underpinning this thesis is *research into student experience*. While I was engaged in this, I was simultaneously engaged in the activity of *tertiary level education* (in Mechanical Engineering), with the possibility of subdivision of the latter with respect to institutional objects. All other potential “activities”, such as solving a problem, are subordinated to one or other of these activities. However, as with discourses, there are also target activities relating to the academic discipline and these are also discussed where appropriate.

What is particularly useful about activity theory for the current study is the attention it draws to goal-directed action. The theory highlights the inseparability of action and its internalised understandings, meanings and motivation. It thereby helps to provide the necessary language for the “thick descriptions” of a student’s responses to discourse. The definitions of discourse and discourse practices seen earlier in the chapter already emphasise the notion of action. It is now possible to take this further in another set of definitions of terms (shown overleaf).

Activity

1. A term that refers to what people do, incorporating both social and cultural processes and internalised (mental) functions.
2. A specific unit of such processes and functions, motivated by an object.

Action

What an individual does intentionally, i.e. with a goal

Operation

Method by which an action is made to happen, dependent on relevant conditions.
When an operation is used, the subject already knows how to perform it.

The idea of activity can be abstracted from a situation – thus the activity of hunting is a useful construct to describe what people are doing collaboratively when they make and deploy weapons to kill animals and divide up the catch. Similarly, there are activities that can be abstracted from what is happening in colleges and universities.

Two main activities are distinguished in this study:

- Tertiary level education in mechanical engineering
- Research into student experience of discourse

Every entry in the reflective journal that is used for the data for the study relates to one or other of these activities, frequently both simultaneously. There are sometimes also references to **target activities** in mechanical engineering, especially later in the journal. However, the actions of the students as described here are related to their tertiary level education rather than their practice as engineers. On the rare (but significant) occasions when fellow students make a comment based on their practice as engineering technicians – and thus their observation of engineering from the perspective of a different activity – then this is made clear.

Definitions of terms in this study: (2) Activity, action, operation

2.3 Conclusion

The review has considered what some of the literature on higher education experience says about students' relationship with discourse. It has been particularly concerned to identify frameworks and a rationale on which such statements might be based.

In the case of phenomenography, the review concludes that the original focus on discourse has been displaced through a preference for looking at outcomes and students' predilections. While outcomes and predilections will both be referred to in the present study, there will be a stronger focus on students' responses to discourse. Moreover, the review of phenomenography has highlighted some methodological concerns over data that result from discourses *about* education practices, and these are taken up in the next chapter.

It has been useful to extend the discussion about phenomenography by exploring suggested alternatives raised by critics. This has brought in the themes of engagement/alienation and academic literacies – themes that recognise the sociocultural setting in which the discourses take place. The analysis of these themes has led in turn to the suggestion that a "thicker" description of some of the situations listed in phenomenographers' "outcome space" might result in different interpretations of what is happening. It has also suggested that an "insider" perspective might provide insights for the thicker description that are normally inaccessible or hidden, particularly those related to students' intentions.

In sociocultural theory, the points of reference are more appropriate than phenomenography for the current study, but the review has highlighted the complexity of the “layers” of discourse that a student will encounter. Responses to discourse are mediated by individual, social and cultural repertoires, artefacts and activities that are available at the time.

It follows from this that the “thick description” of the student’s experience will have to take account of the varying sociocultural perspectives and the associated discourse practices and their interactions.

The literature review has been used to derive definitions of key terms for the thesis and these have been refined to reflect the specific purposes of the study. In this way, it has been possible to highlight differing and sometimes contested uses of terms relating to discourse and activity but to establish my own position with respect to them. “Discourse” and “activity” are both used in this study as abstract nouns, particularly when talking about theory. “A discourse” and “an activity”, while more specific, are still more related to ideas than to practice. I am discussing the discourses encountered in the activity of tertiary level education in mechanical engineering. When I want to refer to specific instances of experience, I shall use “discourse practice” or “action” as appropriate. Under my definitions, a discourse practice is always an action; an action is not necessarily a discourse practice. There is therefore a close relationship between the terms.

Key discourses that are explored in the following chapters as a result of the review and analysis are:

1. the disciplinary discourse of academic mechanical engineering
2. the mediating pedagogic discourse
3. the *discourse of the institution*
4. the social discourse of the specific community of practice in each of the two examples (the college and university cohorts and their lecturers).

The relationships between these discourses and the processes of internalisation are highlighted. The emphasis is on the activity of tertiary level education in mechanical engineering and the students' individual actions with respect to this, but it is recognised that these actions are mediated by people, texts and artefacts.

The work of the following chapters is thus grounded in sociocultural theory – and particularly draws on the tools of activity theory – but will also feature some of the issues raised by the phenomenographic perspective. It will be suggested that both perspectives might benefit from an account of what the student is doing when she is attempting to internalise the discourses encountered on the social plane.

3. Method: A Student's Responses to Discourse

3.1 Introduction

This study aims to contribute to the literature on student experience, through an insider perspective on “what a student notices” in response to discourse. It draws on definitions and tools established in the review of the literature to establish a “thick description” (Ryle, 1968; Geertz, 1973) of an actual student's responses to discourses encountered. These responses to the discourse and discourse practices are conceptualised as “actions”.

It is important to acknowledge that an “insider” perspective is an unusual one, though by no means unique. The use of the label ignores some of the advice from a well-established social anthropologist:

Whenever we turn the mirror for a look at ourselves, we need to report how we are situated vis-à-vis the group we are studying. The best way to accomplish this seems to be to avoid labels like “insider” or “native” that invite confusion rather than dispel it.

(Wolcott, 1999:172)

Wolcott's point on the relationship with the group is well-taken, but I am making the case for my own full membership here. The main reason for using the label “insider” is to highlight the intention to explore the relationship between the group experience and the processes of internalisation that Vygotsky (1934/1987), Leont'ev

(1981a) and Bakhtin (1981) identified, as described in Chapter 2. But there is inevitably some confusion: I have “insider” status as a lecturer in educational development as well as that of a student. Though the latter is the focus of the account, there are also observations from the former perspective. This underlines a need for clarity about the methods used to produce and analyse the data. There is a particular need to be precise about the object of study (students’ responses to discourse) and the unit for analysis (what a student noticed).

This chapter explains how “what a student noticed” was derived from experience and captured in a journal to produce a data set for subsequent analysis (Section 3.2). A section on data analysis then identifies the methods used for the categorisation and subsequent treatment of these data to create an account of one student’s responses in relation to the activity of tertiary level education in mechanical engineering (Section 3.3). Potential problems with the method are considered in a separate section (Section 3.4), which also provides a statement on the scope of the study by considering its acknowledged *actual* limitations.

3.2 Sources of data

Observations in this study are drawn from a number of sources:

1. A journal
2. Notes taken during class
3. Documentation from a college and university attended during the study

4. A questionnaire to find out staff and student understanding of an expression (“learning outcome”)
5. Recorded interviews and notes from informal discussions with my own students.

The main source of data is a journal, described in 3.2.1 below. The other sources are outlined in 3.2.2: their role is to provide additional information and support to the main source.

3.2.1 A journal recording “what a student noticed”

The journal was written during the period when I was a student first at a college and then at a post-1992 university, where I was also a lecturer at the time. Features of this journal are described in Figure 3.1 overleaf.

During the HNC course, I wrote down my immediate impressions of the class just attended during my fifteen-minute train journey home after college. At other times, I would also record my impressions of what was happening when I tried to do the homework from the course or when a particular idea struck me as important.

Feature	College	University	Comment
Period covered	9/9/97-3/6/97	4/10/99-8/12/99	I also maintained the journal between these two periods. I am still writing a journal most days.
Number of days' entries	152 Year 1 – 73 Year 2 – 73 Summer – 8	8 Summer – 12 (after college)	The summer journals tended to emphasise the activity of <i>research</i> into student experience. There is a noticeable drop in the level of journal writing by the university course
Total length	Around 41,000 words	Around 2000 words	Individual entries varied considerably in length
Shortest entry	12 words		3/12/97 <i>I noticed he said "we" meaning "engineers" a lot. "We use $\pi/4 d^2$."</i>
Longest entry	1296 words		23/9/97 Recorded throughout the day from 5.50 am until after the class finished at 9 pm. Included thoughts on spoonfeeding, direct entry students, learning outcomes, volume of work, expectations, feedback, the PhD thesis, orders of magnitude, need for an explanation, another student's altercation with the lecturer, my unwillingness to admit to lack of understanding.
Appearance	Handwritten in A5 booklets, then word-processed	Handwritten – continuous from college journal. Not typed up.	Though I have made reference to the university journal in the findings, it did not feature in my attempts to identify a method of analysis.

Figure 3.1: Features of the data set (entries in the journal)

The writing was akin to “freewriting” (Elbow, 1973; Murray, 2002); that is, regular and unstructured writing where the main rule is not to stop writing. This approach captured the immediacy of the impressions before they were forgotten, although even then some did disappear before they could be written down. The journal was sometimes brought out simply to capture a brief observation; on other occasions there was frequent writing throughout a whole day.

There are aspects of the main source of data that could have been available empirically to anyone else present at the scene – a record of some of the spoken language used, other ways people interacted (such as body language), the written texts used, drawings, other artefacts present, the structure and layout of the classroom, the routines for solving problems, the way experiments were performed, what staff members did and what students did and the timings of these actions (start times, breaks etc). There is another aspect that was “internal” – my selection of what was observed and recorded in the journal, my interpretations, my categorisations and my feelings. The data are therefore a mix of the observable and the internal, or, as Vygotsky would have put it, the social and the psychological (Vygotsky, 1981b:163).

The first entry (see Figure 3.2) is interesting because it differs substantially from my dominant memory of the day (a point that is discussed further in the next section on the analysis of the data set). Another two examples are provided below: a photocopied section from a handwritten booklet to show its original appearance (Figure 3.3) and a full day’s record from a time when I was struggling with the concept of “interferometry” (Figure 3.4).

Figure 3.3 shows how the journal captured observations of what seems to be significant, and thoughts on why these things are significant. It illustrates how observations on my fellow students and also on one of my own classes of students are incorporated in my flow of responses.

Figure 3.4 demonstrates the many themes that can arise over one long day, though there was an obsession with understanding the concept of “interferometry”. This example is considered in depth in Chapter 7; it is shown here to exemplify the range of a student’s responses during the development phase of a potential concept.

The three examples have in common the immediacy of response; they each contain references to what I did, thought and felt in relation to either the activity of tertiary level education in mechanical engineering or to the activity of research into student experience of responses to discourse. Figure 3.4 particularly shows the interaction between these activities.

9 September 1997

Immediate observations

Problems with transposition, when 2-stage. Had to think about what was happening. Was going to substitute real numbers to check but felt under pressure to come up with answer.

Other students also struggled with this and were happy to say so.

Solution – to provide answers that could be used in substitution – one student commented that this didn’t help understand transposition. Made notes during lecture – use diff pen/pencil in future.

To my surprise, would like some visual models to help understanding – want to see what’s going on.

When struggling, everything suddenly becomes a mass of letters & numbers and the only thing to do is write down for later. However, I didn’t really find this session too difficult (despite arriving an hour late because of misinformation)

Some dangers: go for easy strategies to get by; number crunching without thinking

Figure 3.2: The first journal entry

Figure 3.3 Photocopied extract from the handwritten journal

Evening
 Caught up with myself I think but seemed to
 be generally slow on the uptake this evening.
 Think I have to be careful about doing
 what information I've been given. The trouble
 with word problems is that you assume if you're
 been given a piece of info then it must be
 relevant. (It's often a safe assumption.) This
 is partly what makes people jump to conclusions
 simply because a piece of information is
 available.

I'm thinking this particularly in relation to
 problem 3 in tutorial 3B on dynamics. I
 not and started at this because I just don't
 really know what's going on. Actually it may
 be that I do see what's going on here but
 can't relate it to the formula I used before
 that just worked when I put what.
 seemed to be the logical number in. I'm
 not really relating the symbols - numbers or
 words - to the actual situation. I'm
 working more in a second order world
 where this is something you can do but it
 doesn't have to have any meaning. I'm
 giving a deep interpretation of surface

meaning?

Various observations in the classroom. We're
 all at different stages - so we were working on
 our own or in groups. That could have
 "is this the equation you use here" and
 generally satisfied comments from T
 & F
 A, I & J were having an
 animated conversation about engineering
 drawings - nothing to do with the problems
 which they'd be looking at at home.

13/11

Discussion after QMT - A says it's
 not fair that she works a lot harder than
 D & he ends up with higher marks.
 D at school & college has passed
 without doing anything - is sure he can
 do better than A whereas he does. Keeps
 asking questions about stuff he should know -
 at college people told you every step.
 School too - A & J both need for
 things like this they'd had - a structure first

Figure 3.4 A full day's entry

4/3/99 am

Still struggling to understand interferometry and in trying to get help from The Shorter Oxford have realised that the word "fringe" has a technical use I need to get to grips with.

one of a series of alternate light and dark bands produced by a diffraction-grating*
I had understood fringe to refer to the overall pattern, particularly the edge of it.

* plate of glass or polished metal ruled with very close equidistant parallel lines producing a spectrum by diffraction of the transmitted or reflected light.

My problem seems to be that there are too many steps to this process – some related to the final condition required for the measurement and some relating to what you need to do to produce light that is in this condition. This observation – plus the more accurate understanding of fringe - might help me. I'm now ready to try to put it in my own words then refer back to the books to see whether i have missed anything.

Thought – the above shows a deep approach – not one I am necessarily consistent about. I wonder whether a deep or surface approach has any connection with acquiring discourse practices, becoming a legitimate peripheral participant. I think there is a connection – Andrew and Bill B and often Terry give an impression of moving more deeply into the professional community. However, too deep an approach to study could also move them away from the community. I've heard engineers being critical of colleagues who haven't been in the real world.

X [engineering colleague] feels there is no community in his dept – or there is one and he's not part of it.

10 minutes later. Still don't understand. Some questions:

What's actually being measured? How?

A – the slip gauge

By the reflection of the wave of light?

Using known frequency?

Now go back to the original and see whether the maths can be explained in these terms.

Why do the rays have to recombine?

(I was also thrown by the instruction to ignore the final pages of the maths as in fact those contain the explanation or part of it.)

Possible statement for Likert questionnaire.

When I don't understand something there may be a stage of explanation missing.
Later – I think I'm making a little progress and "time on task" is crucial to it – necessary but not sufficient. Reflection is also needed on the following (not classifying types of reflection/thinking – may pick it up later.)

-
- questions still unresolved
 - questions that need to be answered (often in the form of providing definitions)
 - steps in a process that need to be separated out.

The above are examples of straightforward thinking. But they won't work if I don't reflect on

- my current difficulties
 - understandings
 - potential for misconception
- what might constitute an acceptable answer to me – e.g. will I “see” it if I use a different colour and show what's going on with the light
- my previous experience in breaking down difficult tasks into stages and/or providing metaphors or anecdotes that help make them meaningful.

There is also a calculation here about pay-off. I do have to pass this, but I could get away with plagiarism or clever paraphrasing. Other students (Andrew especially) have offered to help. It has become a challenge for various reasons (one being the use of it for the PhD – but I do genuinely think it would be there anyway.) I'm actually genuinely interested in it and I also want to know why it's causing me so much bother.

Want to write down an observation from yesterday that may or may not be relevant. As we drove to Glasgow School of Art we passed a sign which apparently means no right turn. To me it looks as though it should mean no left turn. Check this. [I suspect there was more than one sign.]

Evening

Now feel under control as have results from all the labs and have at least done some of the work – with Vernier and Sigma. Angus M [lecturer] very helpful again and so was John – asking appropriate questions such as “why do you need to take it to zero?” Also they both allowed me to try it out and feel the differences. Most of my results are other people's but I'm not too worried – I'll see what I can make of them all.

Still struggled with interferometry – spent 90 minutes on it this afternoon with the time just flying by. Sometimes the key information you need is hidden in a whole load of text – e.g. that it is the displacement that is being measured. This might be another statement for Likert.

3.2.2 *Other sources of data*

While the journal entries comprise the main source of data and are particularly important for the link with the theoretical perspective, they are backed up in the findings with additional sources, some of which relate directly to “what a student noticed” and some of which are stimuli for this response. A brief description is given of each below.

Notes taken during class

While I was copying down or making my own notes during the classes I attended, I sometimes wrote down an observation on something that was happening in the classroom or inside my head. It was less obtrusive just to note this observation along with my course notes. I did, however, tell the lecturers that I might be doing this, and told them of the broad aims of my research.

Documentation from the institutions

Over the period of two years and four months, I amassed a considerable amount of paperwork. This included module descriptors (though we were not given one of these for every module), problem sheets, and lecture “handouts” (some of which were extracts from textbooks). Some of this documentation provides a useful source of information on what we were “meant” to be doing as students on the course and some provides a reminder of the resources available to students to make sense of the discourse practices.

A questionnaire to find out staff and student understanding of “learning outcome”

After I had completed my two courses, I became curious about how other staff and students understood and used the term “learning outcome”. I emailed all the staff of the university where I worked at the time and where I had undertaken the module on Engineering Design. I asked them: “What is a learning outcome?” and also whether they were an academic, academic related, student etc. (I also explained that this was part of my research into language practices in higher education.) I then posted the same question on a Blackboard (virtual learning environment) site where a survey of students was being undertaken. This was a relatively informal approach to eliciting views on an issue that had emerged during the study as problematic: the different ways that individuals and institutions use the expression. The discussion on this is in Chapter 7 and the data from the questionnaire can be found in Appendix 2.

Recorded interviews and notes from informal discussions with my own students

Because I was teaching a module on communication skills to first and third level engineering students, my experiences gave me a way in to discussing their own target discourse practices. (I had long felt that my lack of familiarity with engineering discourse was a disadvantage in teaching communication skills to engineers.) My experiences certainly did support my teaching practices and the students also seemed to be interested in what I was doing. Before I had decided how to approach the analysis of the main source of data, I thought that I should also obtain some information on other students’ views of their experiences of language. Three students whom I taught communication skills agreed to be interviewed on tape. I also noted some other conversations that I had had with students. While these discussions were interesting, and I have made occasional reference to them,

they are only used to make general observations and do not contribute to the analytical process that is described in the following section.

Finally, I should note one source of data that I decided *not* to use because it seemed unreliable. This was a Likert questionnaire (referred to in Figure 3.4 above) that I had devised for my fellow students on the HNC to see what their views were on some broad statements that had occurred to me as significant; for example: *I still don't know the meaning of some of the words we have used in problems*. Only four of the sixteen students replied, and one of those disagreed with a statement that he had in fact originated. Though the other students knew what I was doing, giving out such a questionnaire on our last evening (which was a social occasion) felt uncomfortable anyway as it was not in keeping with our general relationship. This was definitely a case where there was a tension between the two activities in which I was engaged – that is, tertiary level education in mechanical engineering, and research into student experience. It also reinforced some of my concerns about making judgements based on responses to questionnaires alone.

3.3 Analysis of the data set

I made a point of not pre-determining how the data set would be used, because I wanted to capture the experience as it developed and without any “filters”. Indeed, I wrote the following comment in my journal when I was contemplating discussing it with a colleague: *I don't (still) want anyone or even my own procedures to dictate what I write in my journal. I just want raw real thoughts*. (Journal Entry: 9 December 1998).

Nevertheless, there are also traces in the journal of the process of developing categories of experience that would ultimately become the ones used for the current study. For example, I observed that there were two different types of community – academic and social (16 September 1998). The following day, I reiterated this and then added a comment about institutional differences. On 29 October 1998, I recorded the idea of producing a Likert questionnaire to check my own experiences against those of other students. By 29 April 1999 I wrote the following observation that reflects a developing notion of different types of discourse: *Should make some changes to questionnaire to take into account current thinking, ie institutional discourse, subject discourse, teaching and learning discourse, social discourse*. In fact, as these four discourse “types” emerged as significant, this shows that a set of important distinctions was discerned before the end of the study and the creation of the associated classification can be traced over a period of at least seven months.

The following subsections show how the categories emerged (3.3.1), how extracts from the journal provided the main data set (3.3.2) and how activity theory provided a tool for moving from “what a student noticed” to “how a student responds to discourse” (3.3.3). A final subsection provides a worked example of the analytic approach, based on the first journal extract already provided as Figure 3.2.

3.3.1 Identifying themes and categories

Some of the tools I used to identify themes in the early stages were exploratory and provided prompts for my own memory, perhaps making them difficult for another

reader to follow, but I have included them as Appendix 1 to show the general processes involved.

Before the end of the study and particularly during the two summer breaks, I reviewed the journal to see whether any themes were emerging. I made lists of the main issues that were significant enough to be written in the journal as “what a student noticed”. One such list from the first summer is shown in Appendix 1(a).

I then thought about the role of time in establishing student responses, particularly to the lecturers and to each other. Appendix 1(b) shows an early attempt at analysis of themes under the headings of the subjects and presented as a time line. Doing this began the process of clustering themes: e.g. socialisation of cohort, teaching methods, assessment methods, approaches to learning (others’ and mine), general mood of cohort, questions, observations on what’s acceptable/expected.

During the first year of the HNC course, a timely demonstration in the IT class of the use of concordance files in the word-processing package *Microsoft Word* helped further with the process of clustering: I could identify broad themes and create an index based on recurrence of these themes. In a concordance file, there are two columns: one the word to be indexed and the other the word in the index. Thus *learning, learn, learns, learned* were all classed under “learning” (see Appendix 1 (c)). By using the concordance file to index the typed version of the journal, I could see all the pages where “learning” was mentioned (see Appendix 1 (d)).

The resulting index showed which themes appeared to dominate the journal: assessment, language, learning, lecturers, metacognition, peer support, time management. Once these themes had been seen, some further clustering was possible – there were issues of teaching and learning and also a strong suggestion of social issues. This broad split of academic and social was recorded in the journal as has already been described.

It is interesting that at this stage of categorising (at the end of the first year), there are relatively few records of “engineering” and specific engineering terms. Yet the journal does actually contain quite a number of references to such terms, especially the problems I had with them. This can be seen in Appendix 1 (e), which is a concordance index produced later just for engineering terms. I produced this in the second year.

At the earlier stage of attempting to derive categories, at the end of Year 1, it seems then that my approach was emphasising issues far from what might be expected in terms of looking at how students respond to (academic) discourse. The selection of what to put in an index does of course influence the final outcome of such an analysis. Thus at the end of Year 1, the process of categorising seems to be another aspect of “what a student notices” rather than what emerges from an inquiry into a student’s responses to discourse. I spotted this at the time and recorded it as part of a journal entry.

The kind of categorising I have been trying to do is not helpful – it serves no real purpose. My main observation could be on the socialisation of the group, not the acquisition of conceptions. There is some stuff on

approaches to learning and I think I can make an observation on disappointment.

Journal Entry: 27 July 1998

I would now argue that the categorising did serve a useful purpose; I was just unable to “see” it at the time. Though “socialisation” was not apparently related to my original research questions, it clearly had an impact on the response because it featured so strongly in “what the student noticed”. The indices I created from my categories also subsequently provided quick reference points to particular types of example, which helped me later on.

The timing of the attempts at categorisation may have had an impact on the categories selected as significant. At the end of the first year, our two subjects were IT and communication skills, neither of which brought out problematic “engineering” issues. As I made my first categorisation immediately after these modules, the earlier engineering language problems were probably fading in significance.

I soon began to take more interest in engineering language and concepts, however. A few weeks later, just before I started back at college, the journal records some excitement over the idea of “force”.

Today after a quick glance at my new science book ... I believe I “got” the main point about force. This book, following Newton, does not attempt to define force as an entity but rather to define it in terms of what

it does. And the key area of confusion relates to motion and specifically change in motion.

Journal Entry: 8 September 1998

“Force” and Newton’s second law of motion were mentioned several times after this, as were various other engineering concepts once the term had started. In particular, I noticed that I was questioning engineering words and ideas that I had been previously happy to accept. I wanted to know whether other students were finding the same issues and this is what prompted me to consider drawing up a Likert questionnaire.

Thus the emerging category of engineering or disciplinary discourse can be traced in the journal itself to go along with the academic/social split. At the same time, the journal also shows influences from the books I was reading (see Chapter 2) with focuses on specific **disciplinary discourse** practices (Becher, 1989), the **mediating role of teachers** in the zone of proximal development (Vygotsky, 1934/1987; Edwards and Mercer, 1987; Bernstein, 1990), **institutional and authoritative discourse** (Bakhtin, 1981; Fairclough, 1992), communities of practice and particularly the idea of **socialisation** into them (Lave and Wenger, 1991; Wenger, 1998).

Categories to support the analysis of the findings in the journal are thus partly themselves an extension of “what the student noticed”, but they are supported by literature on student experience and other sociocultural experience. While these categories provide a framework for talking about the discourses to which students

respond – and for grouping observations on “what a student noticed” – they do not account for how the journal is actually used in this study. This is explored in the following two subsections.

3.3.2 Use of texts from the journal

Although I knew from previous experience that journal-keeping was a useful practice, I did not initially specifically conceptualise the journal as an artefact or object for analysis. I was alerted to such a possibility early on in the study, however, when I made a presentation to another institution entitled: “Confessions of a mechanical engineering student”. One colleague suggested that I was being rather negative about myself and that it might be interesting to make a discourse analysis of the journal itself. This not only provided an additional stimulus to using concordance files to find out what was in the journal, it also made me realise that I had a set of ready-made **texts** that could be used for analysis.

Extracts from the journal become texts through their use in a particular activity, in this case the activity of researching student experience of and responses to discourse. Texts emerged partly through the categorisation process already described; partly through a search for evidence to underline a particular point. As texts, they also have a history; they have been produced in a particular way and an “insider” is especially conscious of that production.

The journal-as-text has a physical form – made up of writing or typing (signifiers) – but it also has a semiotic form relating to what is signified (Graddol, 1994). I am particularly interested in what is signified by the texts that can be found in the

journal with respect to “what a student noticed” and why that might have been significant. Though there are many “voices” (Bakhtin, 1981) represented in these texts, as the principal producer of the texts I am in a strong position to identify what was significant about them and to move from there to consider what this can tell us about one particular student’s responses to the discourses she encounters. My colleague’s observation about my own (previously unperceived) negativity, however, suggests that there will be things revealed to others by the texts that I do not see myself (Luft, 1970). This limitation is explored further in 3.4 below.

A method for identifying what is signified by the texts needs to go beyond the identification and enumeration of themes already described. The journal-as-text had to become data-as-text, with the data referring to student responses. What I did with the texts to find out how a student responded is described below.

3.3.3 Use of tools from activity theory

In the literature review in Chapter 2, a case was made for finding “thick descriptions” of what a student is doing when she responds to discourse. The notion underpinning this is of “action”, including both relevant information about the context and the intention of the subject – in this case the student. It was also shown there that “action” is a key component of activity theory, and in my definition of activity for the current study, I indicated that the journal contains responses that relate to one or both of two activities: tertiary level education in mechanical engineering; research into student responses to discourse.

Because the “object” of activity is crucial for distinguishing between activities, I have also suggested that it may be necessary to split the first of these into their different

institutions as there are two different objects: the HNC and the module in engineering design. The object of the broader activity “tertiary level education” may be more contentious and difficult to clarify; however, the term is still recognisable and still provides a reference point for most of the journal entries and it is sometimes used for convenience.

To find a thick description of a student’s responses to discourse, it is clearly going to be necessary to say something about the actions that are motivated by the activity of tertiary level education in mechanical engineering (at the appropriate level). While I do not have access to every single action I made in response to discourse, the data-as-text described above certainly provide a means to identify some of those actions – those that I “noticed” or considered particularly salient at the time. Where actions – including discourse practices and mental actions – can be inferred from the text, I am calling this “data-as-text”.

Because I am the primary producer as well as the analyser of the data-as-text, I can add my own memory and self-knowledge to the process of inferring actions (and also operations) that most researchers have to undertake. Most researchers indeed are not even engaged in the same activity as the students they interview, test or judge by questionnaire. (This is not always the case; contrary examples were seen in the literature review especially with respect to study of academic literacy.) The insider has the benefit of knowing how the activity has energised the associated actions and what the **intentions** behind those actions are. This is true even when the actions are actually inappropriate for the activity, as happens frequently. The activity still provides the motivating object (e.g. gaining an HNC).

Therefore the approach taken in this study is to take examples of data-as-text and to explore the actions that can be discerned or inferred from them. A brief example is provided below to show how this is done.

3.3.4 Example of the analytic approach

The example below has already been seen (Figure 3.2). It is the first journal entry and is particularly interesting because it does not accord with my main memory of the day. It is reproduced in the form that I use in the following three chapters: to allow me to introduce the text, identify the actions that can be seen or inferred, and to add a commentary that is relevant to the narrative of that chapter. Here its role is simply to illustrate the relationship between the data-as-text and the actions derived from it.

What is happening in Journal Extract 1 is that the students have been given some information and are being asked to use it. It involves manipulation of the Boyle's law equation to illustrate the relationships between pressure, volume and temperature; the type of transposition and substitution that it would be assumed were familiar to us (though it was many years since I had had to do it). In fact, these transpositions are a clear example of actions that quickly become operations and there is a suggestion that some of the already were for me.

9 September 1997

Immediate observations

Problems with transposition, when 2-stage. Had to think about what was happening. Was going to substitute real numbers to check but felt under pressure to come up with answer.

Other students also struggled with this and were happy to say so.

Solution – to provide answers that could be used in substitution – one student commented that this didn't help understand transposition. Made notes during lecture – use diff pen/pencil in future.

To my surprise, would like some visual models to help understanding – want to see what's going on.

When struggling, everything suddenly becomes a mass of letters & numbers and the only thing to do is write down for later. However, I didn't really find this session too difficult (despite arriving an hour late because of misinformation)

Some dangers: go for easy strategies to get by; number crunching without thinking

Journal Extract 1: The first journal entry

The actions that can be inferred (and are supported by my own direct knowledge of the situation) include: **make calculations involving transposition of letters and substitution of figures; observe likely difficulties and possible remedies; compare progress with other class members; postpone action until more time/resources are available; evaluate ability to cope with the workload.**

There is also an operation here: "copy from the board", a task I could (and did) do automatically.

The main concern I had on Day 1 was with my own ability to cope with the class and particularly with what we were expected to do – in this case, simple calculations. I was slightly interested in the other students, but not very (which contrasts with later entries). In one way, this response is not too much of a surprise; when I have asked large groups of new students what they are concerned about in

attending university, an overwhelming majority report “being able to cope with the workload”. My journal entry reflects the same preoccupation.

What the example particularly illustrates is that what is salient for a student at the time may not be so later and may even seem insignificant with the passage of time. Not only did I barely mention the administrative problems that made me an hour late for my first class and that remain my main memory of the day, I also neglected to mention another Arts graduate who had also made observations about his relief at his ability to cope with the workload. (This man left shortly afterwards because of difficulties in getting to the course with the change of timetable.) Despite the fact that I *now* think that his presence may have been worth noting because of our similar background and responses, the journal only mentions him once and that is towards the end of the study.

The actions that I took on my first evening will recur in later chapters. It is clear that these were mainly a response to exposure to the discourse practices associated with a particular engineering application – the use of Boyle’s law. I also noted a pedagogic practice – to provide answers that could be used in the substitution to “save” the students from having to work it out. There were a couple of observations about my fellow students, but more in the spirit of comparing experience rather than observing an emerging community of practice.

On day 1, then, there was mainly **exposure** to engineering and pedagogic discourse practices. There is also the suggestion of **barriers** to the discourse – use of short cuts that prevent understanding, lack of visual models of what is going on, and also

barriers caused by the discourse practices – the mass of letters that led to postponement of action. I concentrated on exposure and barriers in my account of this day, but because I did not find the session too difficult, there is a hint of **progress** with the discourse practices. These three themes – exposure, barriers and progress – are frequently present in the data set, often simultaneously.

In the findings, a chapter is devoted to each of these themes. It is hypothesised that a student must be adequately exposed to discourse practices to engage in the activity of tertiary level education and that there are barriers to, from and within those practices. However, students do make progress with discourse practices and progress with their courses (not necessarily the same thing) and such progress should also be examined.

3.4 Potential limitations and actual ones

As was suggested at the start of this chapter, the “insider” perspective can be fraught with difficulties and confusion. There are also a number of potential limitations that might be associated with the specific approach taken here. This section considers possible criticisms of the method in order to discover which factors are likely to provide genuine limitations and thus determine the scope of the exercise. It is based partly on issues and concerns raised by colleagues and friends when discussing the overall approach and includes: a rationale for claiming that the experience is authentic (3.4.1), a justification of reflection as a research tool (3.4.2) and a refutation that I am generalising on the basis of a single student’s experience (3.4.3).

The concessions that remain after these arguments form the limitations that determine the boundaries of the study (3.4.4).

3.4.1 Authenticity of experience

I had two distinctive responses from colleagues to my proposal to undertake an HNC in mechanical engineering (both from engineers):

“You’ll never be able to cope with the concepts.”

“You won’t find anything out. You’ll just buckle down and get on with it, unlike most students.”

I would suggest that both of these responses were based on generalised (stereotyped) attributions about “real” engineering students that assumed that my own experience could not count as authentic. Such attributions might go in the students’ favour or against them, but they do seem to assume that there is a way of describing an engineering student and I was likely not to conform to it. Similar descriptions might be made by students themselves, especially if they do not think they will “fit the mould” or, in terms used here, be a suitable participant in a community of practice. I did initially have some such problems myself with what I was proposing, but this was not sustained. I did see limitations in my participation in engineering by the end of the study, but this is not the same as being an inauthentic student (even despite the fact that I referred to myself as an “impostor”).

The authenticity of my experience of being a student might be challenged because my motive was to find out about discourse rather than to gain a qualification. The “activity” in which I was engaged was research into students’ responses to discourse.

However, being engaged in one activity does not preclude being engaged in another and I am making a case for simultaneously being engaged in the activity of tertiary level education in mechanical engineering.

The experience was qualitatively different from one where I had “pretended” to be a student at an ancient university when I was evaluating an orientation programme for new Law students. There I was role playing and I am not comfortable doing this. On this occasion, my cover slipped very quickly because I did not like the pretence and some of the consequences of it – for example, having to suggest that my background was other than it was. My own weakness in role playing makes the distinction between that and the authentic experience stand out quite strongly; and indeed activity theory is useful for analysing the difference as it recognises the cognitive and affective elements of the actions.

The example highlights the layers of motivation, intentions and goals within any system of activity. For the HNC in mechanical engineering, the intention to achieve the qualification is a justification for regarding me as an authentic student (it is not a complete justification; the other conditions such as matriculation and acceptance by the other participants had to be met as well.) That I had other motives as well is fairly typical of students; in fact, as part of my course I wrote a report on the reported motives of students in doing mechanical engineering. (Most part-time students stated that it was to further their career.) In my role-playing exercise, in contrast, I had no intention of engaging in the activity beyond a few days and I was conscious that I was not going to be positioned as a student by the lecturers involved (beyond their own role playing endeavours).

Thus the notion of a thick description is very useful for distinguishing between different approaches to gathering data, for example: observing a class; participating in some aspects of an experience; role playing a participant; participating fully in the community of practice.

3.4.2 *Reflection as a research tool*

One issue that the “insider” view is trying to address is a concern about the effects of the method on the data. Thus the critique of the phenomenographic approach drew attention to the fact that the process of interviewing a student provides information on their concepts with respect to how they perceive the situation of the interview rather than any “pure” account of what their concepts are.

This study is itself subject to a similar criticism. The method – use of freewriting in a reflective journal – inevitably affects what the student actually does. There were a number of occasions where the recording of an action brought its consequences to my attention in a way that probably contributed to my eventual progress. This of course is what is expected in education; there is currently much encouragement for students to reflect on their learning through journals, personal development planning, portfolios of material and so on. But as the only person in my class (probably) who was undertaking such a formalised process, I was influencing the very data that I was supposed to be looking at.

This charge can probably only be answered in part, and what cannot be addressed is picked up in the actual limitations described in 3.4.4 below. My main argument

draws on the definitions of activity theory: by attempting to make explicit my own goals of actions, I was not moving into a different field of activity as happens with interviews. I was engaged in two activities: research into student responses to discourse and tertiary level education in mechanical engineering. *The actions of one were also frequently the actions of the other.*

This can be contrasted with the usual methods of gathering data: reading a document belongs to a different type of activity – with different semiotic implications – from participating in an interview about reading a document. The actions of the former are removed from the actions of the latter and *may even be at odds with them*. (For example, the student might decide to tell the interviewer what the interviewer “wants to hear”.)

Reflection, then, is justified as a research tool *because* of this feature, which could be called “coincidence of action”. While there is a strong suggestion that the activity of researching human activity always has some impact *on* that activity, in the current study the actions of the research *coincide with* the actions of the activity. The likelihood of distortion should therefore be minimised. It is meaningless to say that I might consciously tell myself what I “wanted to hear”. However, it is not meaningless to suggest that I might write a false account for *public* consumption, nor that I might *unconsciously* limit my access to relevant actions; these points are followed up in 3.4.4 below.

3.4.3 *Generalising students' experience*

Some colleagues were concerned that I was trying to draw conclusions about student experience based on a sample of one – and that I was not a “typical” student anyway. I acknowledge that there can be a temptation to infer a common experience just because one individual experiences something in a particular way and I have been conscious of this danger throughout the study. I have concerns about the notion of a “typical” student and would prefer to put the emphasis on experiences rather than on individual students. Indeed, the idea of variation in experience is a major contribution of the phenomenographic studies cited in the last chapter – my concern about the “labels” derived from the studies relates to the tendency to move back to an attempt to typify students rather than experiences.

Despite my concerns about the emphasis on individuals, I am of course *using* the experience of an individual and am also making inferences about the experiences of other people engaged in the same activity. And I do attempt to draw some generalised conclusions that might conform to the following formula:

In these circumstances, with this level or type of previous experience and this exposure to discourse, the options available to students are...

I am arguably more concerned with what is *not* available to students

In these circumstances, with this level or type of previous experience and this exposure to discourse, students are unable to ...

In both the above cases, the actual situation will have many variables.

My conclusions, therefore, are less about “typical” students and more about what students can and do do given a particular set of circumstances, including their own history. Generalisations relate more to actions than to characteristics of people.

3.4.4 Actual limitations: the scope of the study

The analysis above has suggested some areas where the study might be limited. Specifically, though the experience was authentic, reflection has some limitations as a tool and the resulting data are restricted to one person’s actions subordinated to a major activity. These issues are explored below.

While reflection has the advantage of rendering meaningless such notions as “telling the researcher what she wants to hear”, what is actually recorded as “what a student noticed” may need some scrutiny. It is not impossible that even an insider could falsify data by “recording” something that did not happen but that fits a particular theory or conclusions she wants to draw. As with any fraudulent data, it might be difficult to determine that this is what happened: however, questions would be raised about the data’s “fit” with other data and theories and the explanation for any surprising results. Though I did not of course do this, the fact that I could have does highlight the need to relate this study to those of other people; it should not stand alone.

Perhaps more worrying is a limitation of the reflection that emerged in a few of the journal entries. It is particularly significant in one where I was speculating about my own conception of force and wrote: *“my intention – even in my own personal diary – is not to articulate my understanding but to get it right”* (Journal Entry, 8 August

1998). I had realised, about half way through my HNC, that I was reluctant to record any “wrong” answer, even in the interests of exploring the development of concepts. This is an interesting point in itself; if resistance to articulating a wrong answer is present in private reflection, how much more likely is it in an interview with a more powerful person? The timing also coincides with the start of the second year when I began to pay more attention again to the lexis of engineering (which also influenced my categorisation of the issues arising in the journal as highlighted in Section 3.3 above).

The implication of the above point about reflection is that it underlines the fact that what is written in the journal should not be seen as providing a complete picture.

In addition, the study does only refer to one student’s experiences of an activity; the activity itself (tertiary level education in Mechanical Engineering) is of course much broader than this and care must be taken about conclusions drawn about the activity as opposed to the actions subordinated to it. Some observations about the activity of tertiary level education are considered tentatively in Chapter 8, but the case is made there for saying that a study such as this can only provide some local insights about an overall activity.

3.5 Conclusion

A reflective journal is the main source of data for this study, though it is supplemented by some other data. The journal records “what a student noticed”. The data that have emerged from this are texts created through the processes of

categorising and selection. The categories relate to discourse types: disciplinary (engineering), pedagogic, institutional and social. Selection of texts has been made with a view to illustrating exposure to discourses, barriers to, from and within the discourse practices, and progress with the discourses.

Texts are to be analysed using the tools of activity theory, specifically the definition of “action” as goal oriented and intention driven, subordinated to and motivated by an activity. The aim is to provide a “thick” description of a student’s responses to discourse through identifying the actions that make up that response.

4. Results (a): Exposure to Discourses

4.1 Introduction

As was established in the previous chapter, a “thick” description of my experience as a student should include observations about the discourses and also my own response, described in terms of **what I did or attempted to do** with respect to these discourses. I can be less certain of what my fellow students were attempting to do, but because of my direct access to so much of the contextual information, I am in a strong position also to explore the evidence that leads to inferences about this, especially in cases where we were working together.

This chapter looks at how the relationship with the discourses began, examining the discourses from the perspective of exposure. It seeks to discover the nature of the discourses to which my cohort was exposed, and the individual and group responses to these. As was shown in some of the examples from phenomenography in Chapter 2, when a student begins a programme of study, there is a strong emphasis on previous experience and how it can be related to the new information.

Figure 4.1 overleaf shows the context for the discourse practices to which we were exposed. Because the HNC programme that is the main focus of this study was modular, there were many points of exposure to “new” discourses, particularly new disciplinary ones. There was also exposure to previously encountered discourses – for example, mathematics and communication – in a new context.

Time	Subject	Issues in exposure to language	Principal teaching methods	Assessment
Sep-Nov 1997	Thermofluids	Signs and symbols, new vocab e.g. enthalpy. Student questions All signs and symbols – some familiar, some rusty. Student banter.	Dictation, problem-solving, heuristics	Problems – open book
	Mathematics		Demonstrations, problem-solving, heuristics	Problems – A4 sheet allowed. 100% pass mark
Dec 97-Mar 98	Statics and Dynamics	Signs and symbols, some new vocab. Socialising starts.	Demonstrations, problem-solving, heuristics, real examples	Problems – open book
	Computer Aided Drafting	Visual images and their labels, lack of pre-requisite study. Peer help from expert student.	Lecturer absent most of the time. Attempting “outcomes” with support when available	Drawing objects using package
Mar-May 1998	Communications	All familiar.	Informal chat about achieving outcomes. Worked on own projects in open learning space.	Report, presentation, role playing meeting
	Information Technology	No engineering context	Students exhorted to get on with it; lecturer “fixed” errors	Word, Excel and Access exercises
Sep-Nov 1998	Mechanics of Materials	Entailed revisiting previous year's signs and words	Demonstrations, problem-solving, heuristics, real-life examples	Problems – open book
	Project	My choice to a certain extent – discussed with other students	Lecturer made himself available for discussion over two terms.	Project submitted at end of session.
Dec 98-Mar 99	Metrology	Vocab, signs, symbols, instruments. Other students' work experience.	Demonstrations, problem-solving, discussion, lab work	Descriptions and problems; not open book
	Quality Management	Jargon, slogans, technical terms for procedures; students cynical	Lecturer read out prepared notes. Some group discussion of scenarios and training videos.	3 assignments - reports
Mar-May 1999	Thermodynamics	Entailed revisiting previous year's signs and words	Demonstrations, problem-solving, heuristics.	Problems – open book
Sep-Dec 1999	Engineering Design (university)	Signs & symbols, vocab. Class not all mech. eng students. Less interaction with lecturers.	One lecturer read out text book. Other used exposition, discussion, real life examples.	6 assignments, 2 tests, 1 group project

Figure 4.1: An overview of exposure to language during the study

The findings support the suggestion that the notions of engaging in a community of practice and in a discourse community (Swales, 1990) may be useful for describing what happens to a new student. This chapter adds the newcomer's perspective to such research, describing at first hand how a student responds to exposure to new vocabulary and other signs, concepts, procedures, roles and relationships, institutional norms and participation in a developing social group. It highlights the interrelationship between social interactions and personal action in attempting to access such discourse practices.

The four broad “types” of discourse already identified – disciplinary, pedagogic, social and institutional – serve as a framework for consideration of exposure. However, these types become interconnected and interdependent and there is also evidence of potential clashes between them – a point that is taken up in the next chapter. In each case, the subsection is structured through:

1. a description of the characteristics of each type of discourse and how the students were exposed to it
2. two journal extracts that illustrate this exposure
3. a commentary after each extract on the actions or attempted actions associated with the “moment” in the extract – actions always include a verb and are highlighted in bold font; this commentary attempts a “thick description”, deriving actions from data-as-text as described in Chapter 3.
4. additional observations from the data and commentary as appropriate.

4.2 Disciplinary discourse

4.2.1 *Observations on discourse practices for different modules*

As an HNC student, I was exposed to a variety of modules, not all of which were specifically associated with the discourse of mechanical engineering. Those that were included: thermofluids, statics and dynamics, computer aided draughting, mechanics and strength of materials, metrology, applied thermodynamics. Two others had a more general application but were specifically focused towards engineering – mathematics and quality assurance. Information technology was not regarded by the cohort as an engineering subject – nor was communication, though our reports for that subject had to be on an engineering topic. There were some doubts about quality assurance – an issue that is explored later.

“Engineering” subjects were characterised by an emphasis on signs and symbols and also on visual representation, such as graphs, diagrams and drawings.

It is clear from the journal entries relating to the HNC programme that the ability to engage with the discourses of the discipline was the main preoccupation at the beginning of the course. The initial focus of the journal was on vocabulary and other symbols, and on concepts and procedures. While this is not surprising, it is worth mentioning: it quickly became apparent that even such linguistic elements were themselves affected by previous knowledge and experience, echoing Kress' view that: “No one comes 'freshly' to language.” (Kress, 1989:51). New texts – both spoken and written – to which the students were exposed were viewed in relation to ones that had been encountered before.

Initial exposure to engineering discourse came through thermofluids – a word I had never heard before and which was not in my regular dictionary (Chambers).

Because the class had already started when I arrived on the first day, my very first exposure to this subject was an instruction to copy, from the board, information about the properties of gas. This information did not mean much; my main concern was to ensure I had it written down. We moved quickly from that to performing calculations based on the gas “laws” – equations based on these properties. Much of the time in this subject was spent on copying information and worked examples, and then working through similar examples ourselves. Subsection 4.2.2. contains an example of my response from this time. My second example (4.2.3) provides a contrast: exposure to a set of discourse practices that we did not apparently take seriously. This came much later in the HNC course.

4.2.2 Example: Familiar and new symbols

The extract below, written less than a month into the course, highlights the importance of coming to terms with basic notation and procedures. The analysis that follows attempts to draw out just what “coming to terms with” would mean in this case, particularly in relation to what I was expected to do.

23 September 1997

Both of the sums I'm struggling with would be OK (if I didn't make careless mistakes!) if I accepted that MN/m^2 means it should be multiplied by 10^3 and kN/m^2 is OK as it is. Yet the example he gave us involved multiplying kN/m^2 by 10^3 . I'll need to ask for help, and I possibly can't make much progress until I sort this out. Perhaps if I try some of the other examples it will help, but I shall have to stop to go to work....

Later

I haven't really clarified my order of magnitude problems but think it is connected with R and being able to cancel out multiples.

Journal Extract 2: Coping with basic notation and procedures

Actions

In coming to terms with basic notation, we were expected to work through a number of examples. After a worked example was written on the board, I could then **imitate by substituting symbols** (e.g. letters or numbers) where appropriate. If I could do so, I would **follow the set procedure**, rather than simply imitate. It was necessary to do this as soon as the worked example could no longer be directly imitated – for instance, because the “subject” of the equation was changed. This extract illustrates that other actions at the time included: **recognise errors, multiply quantities, give the symbols a meaning, relate a symbol to a procedure, reflect on personal limitations and options, name a problem** (orders of magnitude), **identify an area for further study** (R), **cancel out multiples**. The main goal here is, however, one which was not achieved and thus the action should be recorded as an attempt: that is to **achieve a result that equated to the one given in the supplied answers**.

Commentary

The action I was *supposed* to be engaged in might be described as “**perform calculations associated with the gas laws** to solve specific types of problem”. Under certain conditions, such an action would be construed as an activity in terms of activity theory. I was a long way from being under those conditions and thus still far removed from engagement in my “target activity”.

There are thus many potential actions associated with this exposure to new symbols and procedures, most of which (though not all) my fellow students would also be performing. The action of recognising errors was supported by the availability of the answer (though there is a problem with this action in its relationship to “learning”, especially if the answers are wrong as is shown in 4.5 below).

An expression that recurred several times in the journal at this stage was a wish to “just see” something. “Just” is not used as a minimiser here; it has the sense of completeness and immediacy – in fact, “just seeing” is the result of the process described in Chapter 2, when actions required for an activity have become automatic – and are then operations (Leont'ev, 1981a). Some of the substitution, transposition and basic calculations that I was doing was at this level.

It is clear from the extract that not all of these actions nor the symbols are themselves new. As an adult, I had already had experience of following procedures and working with symbols. I was already familiar with the “answer supplied” syndrome. I knew about problems with “orders of magnitude” and recognised that I had one. I

knew the convention of substituting a word with a letter for ease of manipulation.

Thus there was no problem with some of the letters in:

$$PV = mRT \text{ (characteristic equation of a perfect gas)}$$

I had not met this equation before, but my previous experience led me to accept without question that P represented “pressure”, V “volume, m represented “mass” and T “temperature”. All of these words have very specific meanings in the context and all are familiar words which had a variety of pre-existing meanings and references at the time. The journal notes fairly soon afterwards that I was starting to question my understanding of these terms: at this stage, however, I was happy to use them and their abbreviations.

R, however, was a different matter and the journal extract above shows that it was only vaguely understood. R stands for the “gas constant”, a noun apparently derived from an adjective according to the notes that were handed out. (The relationship was constant so R became “a constant”.) It is interesting to compare this with Lemke’s observation, already noted, that “science systematically turns verbs into nouns” (Lemke, 2002:42). I did not notice the grammatical shift until much later and not much was said about R in the class anyway. I mention this because my interest in grammar might have helped me with my problem. Although the method for deriving R was in the notes, however, I was apparently not aware of it.

Although R was explained in the notes, the emphasis in class was on being able to use the letter in equations. R was then given a different value for different gases and students were expected to substitute that value into appropriate manipulations of the

characteristic gas equation. I did not really understand what R was about: I just knew I had to incorporate it. Without understanding R 's role as a short-hand expression of certain relationships and properties of gases, my substitution of it into equations was performed on the basis of blind faith. An additional problem arose because of the SI (Système International) units in which R was expressed – kilojoules and kilogrammes. These had an impact on the other SI units in the equation and I was unable to “just see” these abstract relationships. In the journal extract, I suggested that R might be the problem, but at the time my emphasis was on orders of magnitude and the equations themselves. I did not bring R into the foreground until someone else also suggested that it might be the problem. After some additional exposure, I became aware of how I should be *using* R – though this was not yet a complete understanding of the concept.

Journal Extract 2 above therefore shows how some new ideas could be readily accommodated because they followed a pattern already established. The one that caused me temporary difficulty – the gas constant – was one that could not be so accommodated and it required additional exposure.

At this stage, clearly, there is no real exposure to the discourse of academic mechanical engineers. Even the examples of problems used are carefully constructed; though they use some of the lexis of the discourse, they belong more to pedagogic discourse than to mechanical engineering. However, the student is acquiring some of the essential linguistic tools that will ultimately support the ability to “speak as an engineer”. Recognising that my problem was “connected with R ” was the first step to learning what R was.

4.2.3 Example: Exposure and resistance

While the example above shows that I sometimes needed additional exposure to a concept, this may be difficult when a student resists the concept or the language that is being used. The following extract illustrates this situation. It is taken from the first class on quality management, which occurred around two thirds of the way through the course. My fellow students and I had apparently all encountered some of the language of quality management before in our professional lives; this extract suggests that as a cohort we were not receptive to it. Many of the ideas in this class were familiar; the lecturer commented later that for the evening students it was not necessary to explain words such as “specification” which it would have been for the daytime students. Nevertheless, he did have to introduce some important concepts that were new (certainly to me and probably others), for example, “failure modes and effects analysis” (FMEA). This would have been difficult for the lecturer given the cynicism of students, as indicated in the extract about the first class below.

2 December 1998

First “Quality” class....Initial exercise “define quality” in groups brought out quite sophisticated definitions. The class was restless though, because they couldn’t take the subject seriously. (I had problems too – it’s all slogans.) Angus and Drew both argued a bit about issues with the lecturer but most people left early and the lecturer eventually had to give up on “the need for quality”...

It is interesting to see this class talking about their own experiences of “quality” but rejecting the context e.g. “total quality is pish”. A lot of amused and knowing glances were exchanged and I’m sure there will be further observations tomorrow.

Journal Extract 3: Unwelcome language

Actions

By this stage, I felt that I knew my class mates well enough to attribute actions and feelings to them – for example, stating that they were restless and did not take the subject seriously. For this reason, this extract is also significant for the social

discourse, but by this stage we had been well exposed to that. The social aspect is important; the actions that were going on here were reinforced by social approval as seen in the “knowing glances”. I have separated out the actions into other people’s (inferred) and my own (known). However, despite the way it is written, one of my reasons for feeling confident about the class’ “mood” is that I shared it.

The actions I observed were: **define “quality” from previous knowledge and (work) experience; question the need for the study of the subject; relate practice to theory, favouring the former; question the theoretical basis of the subject; parody the language used in the subject** (“total quality is pish” parodied definitions/slogans heard in a training video we were asked to watch); **check personal responses against others in the class; express solidarity with classmates; reject the teaching offered for this class; leave before the class officially ended.**

My own actions in this section were largely motivated by the activity I am calling *“research into students’ responses to discourse”*, specifically: **evaluate classmates’ responses to questions, infer classmates’ mood**. The observation in brackets is one that I can label **express solidarity with classmates**, making it belong to the main activity that I am calling *“tertiary level education”*. This solidarity, only verbally expressed in my private journal, was also present in the “knowing glances” as I know from memory that I was also involved in the exchange of glances. It might be difficult for anyone else reading my journal to be sure that I felt solidarity with the other students; it could read more neutrally, as though I were mainly observing rather than participating.

The action of leaving the class before it had officially ended was repeated at every class, with many students only staying long enough to pick up the notes that they then used to complete their assignments. As the main teaching method was to read these notes to the students – though there were some group discussions as well – students clearly felt confident that they would have sufficient information to do what was required. A few of us stayed a bit longer – notably one student for whom quality management was a significant though contentious issue at work – but the lecturer frequently felt he had to abandon the class early and expressed some concerns although “at least they’ve got the notes”.

Commentary

This “exposure” to new disciplinary discourse differs considerably from that in Journal Extract 2 for several reasons: the situations being described in quality management were familiar to most students, the students were well established as a cohort and could reinforce one another’s opinions, the students did not regard the subject as truly “engineering” and this was the third such subject they had encountered by this stage. (Ironically, however, the assignments did actually seem to demand tasks that would be encountered in a real engineering environment.)

The emphasis in this extract is therefore much more on students’ perceptions of the worth of what they are doing: in activity theory terms they might be regarded as questioning whether the classroom practices are really appropriate for the activity of tertiary level education in mechanical engineering. They could be said to be asking whether they are learning about their target activities and target discourse practices. This is a situation familiar to many lecturers – and it is one I have encountered

personally when teaching communication skills to engineers. My own experience as a student has underlined the need for making the relevance and need for the study explicit where possible.

I did at the time reflect on the problem with quality management as a topic for the students; using Diana Laurillard's notion of academic study as a "second order experience":

My feeling is that it [Quality Management] is apparently too close to the first order experience (as perhaps is Communication) for it to be acceptable. It possibly helps when Japanese expressions are used as this removes it into a second order practice.

Journal entry: 9 December 1998

However, I did not find any evidence for the success of Japanese expressions with this particular class and the resistance of the students to the ideas of quality management persisted.

This analysis has suggested a number of possible reasons for resistance when the mechanical engineering students were exposed to this particular discourse : they did not regard it as legitimate/relevant to their main activity; the relationship between theory and practice was too tenuous; the language itself was problematic, for example the jargon did not have a clear value. What these issues have in common is the students' attempts to link the new information to existing knowledge, values

and practices. This is the same link as was seen in Journal Extract 2. The examples therefore highlight the fact that existing knowledge and experience were involved whether I found myself *complying with or resisting* the discourse to which I was being exposed.

Resistance does not necessarily result in academic failure; indeed, the ability to parody, seen in the slogan-making in Journal Extract 3 above, entails knowledge of the domain that is being mocked and skills that could be put to good use in that domain. (This echoes the example of Ryle's thick description of a parody of a winker seen in Chapter 2.)

4.3 Pedagogic discourse

4.3.1 Overview of discourse practices used in teaching

Figure 4.1 at the start of the chapter indicates a (fairly small) range of teaching methods: dictation/copying, problem-solving, heuristics, demonstrations, real examples, help when requested, discussion, lab work, reading.

There was probably less interaction with lecturers on the university course (though the effect of this was difficult for me to assess personally as I was a close colleague of one of them and was in fact able to discuss the actions on the course with him.)

One observable difference between college and university relates to the pacing of material; while the lecturers were in control of the pacing in both cases, there seemed more of a willingness to adjust to the students' actual pace at college. On

the university course, the topics to be covered each week were firmly established and did not slip if the students had not kept up.

By the time they enter tertiary level education, most students will have many years' experience with pedagogy. The experience for each student of course would not all be the same; it depends on their age, where the students live, their cultural background, and particularly, the values to which they were exposed in previous institutions. I also already had experience of tertiary level pedagogic discourse, though it was associated with different academic "tribes". My fellow students already had experience of some features of engineering discourse in their work as technicians.

At college, the lecturer who introduced us to the discourse of academic mechanical engineering used several other discursive approaches in addition to writing on the board and setting problems. He occasionally (not often) read out a set of notes to us, he sometimes dictated notes, he gave us sets of ready-prepared notes, he demonstrated and talked through how to do the problems, he gave hints and feedback on our own efforts, he asked and answered questions, he provided heuristics such as "write down everything you know", he set the assessment and he controlled the pace of learning (as will be shown in the second example in this section). The usual sequence was some transmission of information, the demonstration of how to solve a problem, followed by the students' attempts at further problems on worksheets (which had answers).

The discourse in which these actions were couched was largely unproblematic; students were already accustomed to instruction as a process of being given information and asked to do something with it. However, the very fact that pedagogic discourse is so familiar does result in some problems, such as students doing what they are asked without actually seeing any sense in it – an issue that will be explored in the next chapter but which the extracts below may also help to illuminate.

There are two journal extracts in this section: the first (in 4.3.2) now resituates the “problem with R” as a pedagogic issue and indicates a complex set of responses of an individual student (myself) to the discourse with the teacher. The second (4.3.3) makes observations on the actions of a fellow student in relation to exposure to the pedagogic discourse and the impact that this had on the rest of the class.

4.3.2 Example: Student and lecturer communication

The example below follows up my concerns about orders of magnitude. Later the same day, I had a class where I hoped these concerns might be sorted out – that the lecturer would provide increased exposure to the engineering discourse practices.

23 September 1997

This evening's class was tricky in parts and not so bad in others. When the lecturer simply read the notes aloud to us I hadn't a clue what he was talking about. I haven't really clarified my order of magnitude problems but think it is connected with R and being able to cancel out multiples. I will have to get to grips with it and have got a book out of the library. I told the lecturer about it and he did explain it in terms of cancelling out but I think I should probably get someone to go over an example with me.

Journal Extract 4: Student and lecturer communication

Actions

A large part of a student's time can be spent listening. In this section, my actions were: **listen for connections with existing knowledge, listen for cues on what to do.** My failure to make these connections and find these cues led to further actions. In reading notes aloud to us, the lecturer was not dealing with my own concerns and I had to speak to him separately about those. The additional actions were: **explain my difficulties, ask a question, conceal lack of understanding, identify/interrogate other sources, postpone the attempt to understand until other sources can be found.**

The action "conceal lack of understanding" is one that applies both to the failed transmission of material that was read out to us and to my response to his explanation of "cancelling out". I remember making such a concealment and in fact observed fairly soon afterwards that this was something I was particularly likely to do. It was not directly recorded in the journal, though I did refer to it, but I became very aware that when this lecturer said: "Are you all following this?" my response was that I had no idea what he had been talking about but I was not going to make this obvious. I was conscious of attempting to hold my face as rigidly as possible in order not to let anything "show". (Once I had caught myself doing this, I realised it was a non-productive action and effectively stopped making such an extreme response, though I did continue sometimes to choose not to reveal ignorance about something.)

“Postpone the attempt to understand” is a complex action as it is almost the absence of an action. It is not, however, the same as “**switch off**” (which is considered in the commentary below in connection with this extract). The idea of postponing does contain an intention to engage but the “how” and “when” (operations) are not “in this way” and “now”. Switching off, a metaphor drawn from human uses of artefacts such as radios and hearing aids, is also an action but is not part of a chain of actions in the same way as postponement is. Switching off, whether deliberately or not, results in no further operations or action and ultimately no engagement with the activity. The outcome, however, might be the same in both cases, especially as the postponement may result in unintentional switching off.

It is quite likely that there would be a common “thin” description for all the complex actions: **conceal lack of understanding, postpone** and **switch off**. It would probably have to be worded negatively: for example, “do nothing in relation to the topic”. Yet the three actions have different goals and are also likely to have different results in relation to the main activity (tertiary level education).

Commentary

In Section 4.2 it was demonstrated that entirely new concepts required a certain amount of exposure before they could be assimilated. Journal Extract 4 above shows a student's concern over the fact that the teacher appears to be “building on sand” (Laurillard, 2002:25). There is a tension here between ensuring strong foundations before moving on to the next concept and building those foundations *through* the new concepts. By continuing to instruct, it is possible that the lecturer was adding new exposure to the concepts that were causing problems, and, on reflection, this

does appear to have been the case in this instance. In Vygotskian terms, the lecturer was instructing *ahead* of development. He was attempting “to use instruction to bring out those processes of development that now lie in the Zone of Proximal Development” (Vygotsky, 1934/1987:211). He had to make assumptions, of course, about our ZPD – and had to make it on a cohort basis.

My confusion, which can be seen in the actions associated with this extract, may not necessarily have been a “bad thing” – in Chapters 5 and 6 it is demonstrated that continued exposure to ideas did eventually break through the fog and that there was a benefit in the fact that there had been difficulties. Some classroom linguistic activities, however, seem to have the ability to shut the students' response off totally (and the plural is used deliberately as a cohort response could be seen in this respect). One of these is reading aloud.

Reading aloud from a paper (sometimes when everyone has it in front of them) is not unique to the classroom: it is also a technique sometimes used, for example, at academic conferences, though in the latter case, the audience may already have considerable knowledge about the topic being “transmitted”. Such an approach can have the effect of distancing, reinforcing its role as what Bakhtin describes as “monologic” or “authoritative discourse” (Bakhtin, 1981). While the intention appears to be to provide information, it does not have the immediacy of day-to-day speech, which is more dialogical in nature. Because written and spoken language have different features – for example, there is a greater lexical density (Halliday, 1994b) and syntactical complexity (Vygotsky, 1934/1987) in written language – they are “understood” in different ways. Listening to written language on this particular

evening made it harder to understand, especially as it was building on material that had not been completely grasped. I considered later that I would have benefited from the redundancy of spoken language – the repetitions and restatements that would have increased exposure to the ideas and allowed for cross checking.

The effect of this approach to teaching – whenever it was encountered, both in the HNC and the second level module I took at university – was to switch off the engagement with the discourse, at least for the present. This seemed to affect many, if not all, of my fellow students too as was shown in Journal Extract 3. If it was clear that the lecturer was *only* going to use this technique, students would ensure that they had the written version and leave. On one occasion, a student described being present as “a waste of typing time” as we had a report to write. Another, in the university module, commented: “I could stay at home and get my girlfriend to read the textbook to me.” From a student's perspective, the teacher's role in such a situation is simply to direct the students' attention to what is required. Students did feel, however, that there was a lack of “teaching” in these instances. Vygotsky would agree with them:

...pedagogical experience demonstrates that direct instruction in concepts is impossible. It is pedagogically fruitless. The teacher who attempts to use this approach achieves nothing but a mindless learning of words, an empty verbalism that simulates or imitates the presence of concepts in the child.

(Vygotsky, 1934/1987:170)

This quotation illustrates that it is not just that this is an ineffective way of getting information to a student. The actions that arise in response to it can only be (at best) **simulate and imitate the language that expresses a concept**. (It will be suggested later that there is a place for simulation and imitation, but only as a stage on the route to genuine appropriation.)

4.3.3 Example: Mediation and control of the discourse

As already suggested, my own response to my lack of understanding was to determine to “sort it out later”, by referring to books or peers. My existing resources did not allow me to access the situation as a comprehending listener; the journal suggested later that postponement is my usual response to such a situation.

Not all students were prepared to adopt my strategy, which is arguably a risky one (and one the journal subsequently records as having weaknesses). The second example in this section illustrates a student, Terry¹, who took a different approach. He had a concern that the teacher was not providing the necessary exposure either to the engineering practice or to the institutional requirements (though he probably would not have expressed it in such terms himself). Terry frequently attempted to find answers to any gaps in his understanding by asking questions; the rest of the class were grateful to him.

¹ All students' and lecturers' names have been changed

23 September, 1997

There was an interesting altercation as the person who asks most questions showed concern about not having a particular explanation – in case it was required for the assessment (see today's notes). At the break, he said he felt he was the dunce asking all the questions but his neighbour said "no, good on you mate. I don't have the bottle".

Journal Extract 5: "How are we meant to know this?"

The notes referred to in the above journal extract are reproduced below.

From notes taken during class, 23 September 1997

Lecturer (writes on board)	kg metres per second square = newton
Student	How are we meant to know this?
Lecturer	I don't want to get bogged down in this question
Student	Do we not need this for the assessment? What's going to be in the first assessment?

Actions

In this example, there are apparently some joint actions: by his use of "we", Terry appeared to **ask for clarification** on behalf of the class. He also used this exchange to **express concern about adequate exposure to the discourse** and to **ask for cues about the assessment**. In doing this, he appeared to **confront the lecturer** (albeit fairly mildly) and this did result in some feelings of discomfort, at least for me and probably for others. The rest of the class were also interested in the answers to these questions; this made us **listen for clarification on specific issues** along with Terry. His neighbour's reassurance met with other nods and noises of approval from those of us around them. Terry's comment about being the dunce was of course an

attempt to **seek reassurance and support for his intervention** – an action that properly belongs under the “social discourse” heading below.

Terry and I therefore responded with different actions to our perceived gaps in our knowledge: while I looked at postponement and other potential sources of information, Terry sought immediate clarification. I was, of course, happy to respond to Terry's intervention with my own action – **listen for clarification about the terminology and the assessment**. The social flavour of this extract is very strong and the incident did provide an early indication of a developing community of practice.

Commentary

The lecturer, of course, also has a role in this developing community. We were dependent on him to mediate the abstract ideas we were facing. In writing “kg metres per second square = newton” the lecturer was providing a definition. When we started to see the symbol N for newton, this definition should have helped us to know what it meant and alert us to the use of particular SI units. However, the notion of a “second square” needed to be unpacked as well and this is tied in with the concept of “acceleration”. To fully explain this definition would have involved the lecturer in a lengthy account of the use of notation and an underlying complex concept, both of which might well have been assumed as prerequisites for the course anyway. The lecturer probably did not have time to do this and the explanation would also have taken him away from the specific procedure he was working on. He could only give us exposure to a limited amount of the available

pedagogic discourse on the topic. He had to be in control of the discourse, which is why a challenge to this control created an uncomfortable feeling.

In Fairclough's terms (1989:165), we found that we had to use our existing resources *creatively* as opposed to *normatively* to gain access to: (a) the concept of a newton and (b) what we were supposed to be doing with it to function successfully in this particular classroom. The pedagogic discourse thus recontextualised the discourse of engineering (Bernstein, 1996:46). In students' terms, this meant that we were learning a new language but had to trust the teacher that it would be appropriate in its engineering context as well as in the classroom. For the time being, we had to be content just to accept the words and symbols and use them if we could.

The pedagogic discourse, then, is connected with learning in that it sets up a framework in which the recontextualised discourse can be accessed and eventually appropriated. In the way the account has been presented in this section, students may be exposed to and required to work with concepts that they do not initially understand. They must conform to their role as students in the context of the classroom, but this does not necessarily mean that they have learned something specific. "Learning" is not an observable direct result of the teaching; it emerges indirectly, via a combination of the individual student's existing resources and their creative engagement with the new practices. However, there are, as has been indicated, a number of actions that arise in response to the pedagogic discourse, some of which may contribute to the learning.

The concern expressed in Journal Entry 5 above was as much to do with the assessment procedures to be used as it was to the concept itself. It was seeking access to what might be described as “the way we do things in this classroom – and this college”. The institutional implications of this are considered in the following section.

4.4 Institutional discourse

4.4.1 Institutional practices: access and accreditation

The characteristics of the institutional discourse emerged from several sources: a recognition of different discourse practices at university from those at college (ultimately suggesting that two different activities had to be considered); the authoritative nature of certain types of discourse practice as identified by such writers as Bakhtin (Bakhtin, 1981) and Fairclough (Fairclough, 1989); the authoritative discourse practices I “noticed”. Though these practices were mediated by the lecturers, they were tied to the institutions, namely: the college, the Scottish Qualifications Authority, or the university.

My experience included exposure to the discourses of two institutions: an FE college and a new university. I had attended an FE college before for a module on counselling skills and I was a lecturer in the university, so the institutional discourses were not entirely unfamiliar to me. One point that this section will stress, however, is that familiarity with one tertiary level discourse does not guarantee complete familiarity with them all. Equally, experience as a lecturer is not an adequate

preparation for being a student in the same institution (as I was already aware from the experience of being a “pretend” student described in Chapter 3).

Institutional discourse is a broader category than that of the specific academic tribes that are located in it. Its reference points tend to be associated with the processes of admission and certification – and all of the actions that are necessary to ensure that both processes are achieved on the basis of a required standard. Brown and Duguid describe this process as “warranting”:

In complex institutional ways, it [the university] warrants its faculty, its courses, and its degree for the learner. And once a learner has graduated, the university also warrants the learner for future employers and associates, signaling once more to those who cannot assess the knowledge of the graduate directly. The university, then, represents learning to individuals and knowledgeable individuals to society.

(Brown and Duguid, 2000:216)

In the terms used in the present study, therefore, the academic institution is a site of a considerable number of complex meanings, though the above quotation provides a valuable summation of these meanings. Brown and Duguid point to the fact that this summation is particularly useful in providing an appearance of something that society directly values while allowing the university to continue with “activities that may be socially valuable but are not easily valued in the market.” (Brown and Duguid, 2000:217). Interestingly, included in these activities which “can serve both students and society with more than they know to ask for” is a set of encounters with

a range of communities of practice. (This range is possibly wider in the US than in the UK because of different practices in universities.)

It is then perhaps not surprising that the student finds herself faced with the “institutional practice of mystery” (Lillis, 2001) where the external perceptions do not necessarily tie in with what happens in the institution. For the student, the discourses associated with warranting are related to the student's acceptability as part of the institution (admission) and the hurdles she has to overcome to achieve her eventual certification (assessment). An example of each is provided from the journal, along with an identification of the actions relating to its associated mysteries.

4.4.2 Example: Access to institutions and practices

The acceptance of the student by the institution may depend on some prerequisite learning. This was almost immediately an issue for me in terms of access to the disciplinary and pedagogical discourses. On my second day, I attended my first Computer Aided Draughting (CAD) class (though this module was subsequently postponed). Journal Extract 6 indicates my reaction to being exposed to the discourse of technical drawing for the first time. This example is included under institutional discourse, because, according to the institution (mediated by one of its lecturers) I “ought” to have been exposed to technical drawing previously.

11 September 1997

CAD will be quite difficult though familiarity with computers' idiosyncrasies may help. Particularly interested that the lecturer was stressing this was just a tool for the tech drawing we'd have done at school!...

I wouldn't like AUTOCAD to be my first introduction to a computer... and much of it seemed completely bewildering. I'm not afraid to press buttons though!

The notes take you through things step-by-step and I wonder how much I should try to follow the actual geometry. I think I'll have to, in order to complete the learning outcome; it may well be second nature to the other students – I'll need to find out.

I expect to learn about tech drawing through this package and what I'm expected to do, rather than the other way round – using it as a tool. I wonder whether this makes the learning easier or harder.

Journal Extract 6: Lacking pre-requisite knowledge

Actions

This very reflective account shows the student's response to a potentially alarming situation where it is clear that the lecturer will definitely “build on sand”. A number of actions are referred to here: **identify potential difficulties with understanding the discourse and personal resources to help overcome them; identify methods to overcome the lack of pre-requisite knowledge; experiment with equipment; plan a strategy to understand what someone else has written/drawn; predict effectiveness of strategy for finding out about something currently unknown.**

In relation to the institutional discourse, the main action is to **identify methods to overcome the lack of pre-requisite knowledge**. There is an additional (or possibly alternative) complex and tacit action similar to the one about concealing ignorance in the previous section: **attempt to acquire the “pre-requisite” knowledge in other ways while concealing lack of it from the institution.**

These actions, of course, were not ones in which I was *supposed* to be engaged, even though they were stimulated by the main activity (tertiary level education).

However, I was unable to learn how to use AUTOCAD for technical drawing when I did not know how to do technical drawing. I could not participate in this particular aspect of the activity as I did not have the discourse practices that were essential for such participation. The “thick” description of what I was doing could certainly not include any positive “technical drawing” actions. This had further implications for engagement with associated *target* activities and discourses.

Commentary

I had no experience at all of technical drawing, but I later discovered I was not the only student without the required qualifications. This gave me a sense of solidarity – if there were a few of us then I would not be singled out for criticism. It was a relief to think that this was the “fault” of admissions procedures rather than attributable to the absence of some essential knowledge that I might be accused of having pretended to acquire.

The lack of knowledge of technical drawing did prove to be a problem later. This problem relates to the discourse of the discipline, but the issue of admission is an institutional one. The analysis below suggests that access to an institution is about more than admission: it depends on the students' perceptions that they can participate in appropriate practices. For this to happen, they need exposure to those practices, and as quickly as possible.

In my professional life, I am aware that many students share the type of concern I had in relation to pre-requisite knowledge. This is particularly true of direct entry students, some of whom quickly suspect that their “access” to higher education may

be based on false premises because they have not covered at college what other students did in first or second year at university. It is easier to see this when thinking about actions towards an activity rather than syllabus – but it is likely that many decisions relating to articulation between courses will be made on the basis of syllabus rather than activity.

Journal Extract 6 above has a flavour of both apprehension and bravado: a student clearly expecting to be able pick up the prerequisite knowledge that was missing. Exposure to the discourse practices that related to technical drawing would have to be mediated not only through pedagogical discourse but also through the practices of CAD. My survival in the institution depended on my being able to make up the shortfall – or at least appear to be able to – in engagement with the discourse practices of CAD.

4.4.3 Example: *The institution and learning outcomes*

A deeper concern, perhaps, relates to process rather than content. In both the university module and the college course I was conscious of the need to gauge quickly “the way we do things round here”. At college, students soon realise that the main “currency” of the institution is the learning outcome. Achievement of learning outcomes allows students to remain in the college and also has a transfer value for other colleges and universities. Journal Extract 6 has already made reference to achieving a learning outcome; the following extract underlines the importance of that particular expression.

23 September 1997

In college, the main thrust forward is the learning outcome. You have to do so many in 11 weeks – that's going to be one every couple of weeks. We haven't done any yet – may do one tonight.

Journal Extract 7: The institutionalised learning outcome

Actions

At first glance, perhaps, there does not seem to be much action going on in this short extract. There is one very important one, however: **acknowledge the definition of “learning outcome” as a piece of assessment**. Two associated ones are: **anticipate being assessed on what has been learned** and **identify the implications for oneself of the assessment procedures of the institution**. My classmates and I all engaged in at least the first two of these three actions. While the second one is particularly familiar to students who have been through primary and secondary education in the UK (and probably much of the world), the former requires some attention.

Commentary

It is interesting that a learning outcome is described as something that a student “does”, but there is a difference between a learning outcome and an action in Leont'ev's sense. The “thick descriptions” of my actions underline these differences; the discussion below brings out some of the associated implications.

In writing about the learning outcome in this way, I had adopted the convention that this was another name for “test” or “assignment”. I did not always use the term in this way; however, I did so unequivocally when I was referring to practices in college. Success in the institution depended on being able to recognise and comply with such usage; exposure to the discourse soon made this need clear. If I had

adopted my existing “normative” understanding of learning outcome as “something that is a result of learning”, I would not have prepared myself appropriately for the tests that were coming up. I needed to conceive of it as a test, even if my other experiences led me to resist this use. To engage with this institution, I had to accept its norms – or certainly give the appearance of having accepted them, which arguably amounts to the same thing.

Learning outcomes in Scottish further education colleges at the time of this study (1997-1999) came as highly structured statements of intent. They were given to the institutions by the Scottish Qualifications Agency (SQA), so the college lecturers had no say (beyond, in some cases, an initial consultation) in what they were in terms of statements of intent. They were expected, however, to draw up the appropriate assessment instruments, although these were tightly constrained. Figure 4.2 shows the learning outcomes I had to achieve from the thermofluids module. Each was associated with performance criteria, a range statement and a statement of evidence requirements that also came from the SQA.

OUTCOMES

1. evaluate properties and changes of state for perfect gases and vapours;
2. evaluate energy transfer for perfect gases and vapours;
3. calculate pressures, pressure differences and hydrostatic forces;
4. apply energy, continuity and momentum principles to non-compressible steady flow processes.

Figure 4.2: Learning outcomes for thermofluids module

Figure 4.2 shows how the outcomes themselves are worded in the discourse of the discipline; the notion of outcomes, however, is part of the institutional discourse. The usage, common to staff and students in further education colleges, is to have a direct correlation between the statement of intent and the actual piece of assessment – thus the question: “What will be in the outcome?” has a very precise and commonly-held meaning relating to assessment. This is a practice that does not necessarily carry into universities (and certainly not into the second institution in this study) and can cause some confusion for direct entry students. (This issue is considered in detail in Chapter 7.)

The theoretical perspectives underpinning this thesis – from both sociocultural and critical discourse analysis traditions – support the view that an institution both determines some discourse practices of its members and is determined *by* those practices. The continuity of the institution is dependent on participants being willing and able to engage in their role in it. These arguments can be found, for example, in Edwards and Mercer (1987), Lave and Wenger (1991) and Fairclough (1992). My examples suggest that at the point of access to this dialectical process, the student instinctively recognises that she will need to comply with a set of norms – or at least give the appearance of doing so. One task is to identify what these norms might be. Another is to engage in discourse practices as though they are already familiar. As Bartholomae puts it:

He must learn to speak our language. Or he must dare to speak it or to carry off the bluff, since speaking and writing will most certainly be required long before the skill is “learned”.

(Bartholomae, 1985:135)

Bartholomae describes this effect as “inventing the university” and suggests that students “try on” the discourses before they have actually acquired them. This is about more than moving from “just putting in the numbers” to being able to “just see”. It underlines the requirement on the student to be able to use the discourse practices creatively – as though they were normative. The more they are exposed to examples of relevant discourse, the more accurate their “trying on” is likely to be. Hence there is a need for students to gain access to discourses as well as to gain admittance to institutions. For access to discourses, students need exposure to them. This point exemplifies the blurring of the distinction between metaphorical and actual place, referred to in Chapter 2 above.

“Access” is a current preoccupation in tertiary level education. Wider access programmes seek to allow more non-traditional participants in further and especially higher education. The emphasis in such schemes is not usually on providing access and exposure to discourse practices: it is more on helping people to gain qualifications that will allow them to proceed. It might be argued that in gaining the qualification the student is inevitably exposed to the relevant discourse practices, but this is not the case. Access schemes are often actually separated from the targeted institutional practices: for example, further education colleges run access courses for university. This thesis will suggest that gaining a qualification in one institution does not guarantee access to the *discourse practices* of another. It does not provide the necessary exposure to the discourse practices that will ensure compliance with its norms. A student entering directly into third year at university cannot be assumed to know the norms of the institution, nor how these norms have affected the pedagogic

discourse practices that themselves mediate the disciplinary discourse. They will not have engaged in some of the types of action that the students who have been through two years of university have. Ultimately, they have not been engaged in the same activity. As suggested in Chapter 3, it may be necessary to divide the activity of “tertiary level education in mechanical engineering” into two (or possibly more) activities once the institution has been specified.

If the way to achieve a learning outcome in a topic at college follows a particular pattern – for example, a demonstration followed by a similar question – then the student is likely to infer that that is what a learning outcome is.

The institutional discourse is probably the least obvious of the four external discourse “types”, but success in an institution will depend in part on appropriate responses to its norms and genres. The examples in this section have suggested that this may mean (a) finding ways to engage with missing discourse practices and (b) the transformation of current understandings or ways of doing things into those that are more appropriate for the new institutional context.

4.5 Social discourse

4.5.1 Social practices: exposure and participation

The three discourse types already introduced – disciplinary, pedagogical and institutional – contributed to the classroom practices and could even be said to delineate what was or was not acceptable in this particular classroom. Nevertheless,

the emerging community of practice was the cohort of students themselves, and the lecturers who taught them.

Figure 4.1 at the beginning of this chapter shows that social issues in exposure included noticing other students, banter, socialising, peer support, benefits from other students' work experience. There is a sense of a developing cohort response to situations; for example 15 months into the HNC, there was a shared perspective on the subject of quality assurance as has already been seen (Section 4.2). This does not mean that everyone took this perspective, but a dominant cohort view can be observed in the later journal entries.

Social discourse is used here to refer to the language practices used by the students in the process of forming a cohort and also smaller social groupings. In a new class, social discourse has itself to be established and so individual access to it is partly constituted in the process of its formation. Thus there is a marked difference between accessing an already established community of practice and creating that community from scratch. While the latter is the main concern of this analysis, there are implications about the former. This section looks at access to this social group in the cohort of HNC students; there are additional implications about exposure to the social discourse of academic engineers which this group does not initially represent. Two examples are considered from the earlier stages of exposure to the developing discourse: making comparisons (4.5.2) and developing shared experiences (4.5.3) through positioning and banter.

4.5.2 Example: Making comparisons

Most of the early journal references to other people relate to ability to cope and how I compared. On the day that I recorded difficulties with orders of magnitude, I was also keen to note that I was not the only person with problems, and that I had some advantages over the other students. The following extract is just one of several that highlight a student's concern to establish how she is performing in relation to the developing norms in the classroom.

23 September, 1997

The others had also struggled with some of the worksheets – not helped by the fact that some of the answers are wrong... Many of the class seemed to have difficulties with the negatives involved in $Q = \Delta U + W$ which I wasn't too worried about.

Journal Extract 8: Comparing progress with classmates'

Actions

The main action here is related to the title of the extract: **compare progress with classmates'**. The action that we were supposed to be engaged in was a typical classroom one of working through examples. Another (thicker?) way of describing this is: **achieve a result that equates to the one given in the supplied answers** (this one has been seen before – here its dubious value is highlighted). Some contributing actions are: **calculate relationships between heat transfer, change in internal energy and work done; distinguish between heat going to and from a system using the concept of “negative” quantities**. The fact that I was not too worried about the last action, invokes another one: **use previous experience of the logic associated with double negatives**. (In fact, I had “operationalised” the action of using double

negatives.) The complicated social relationship brought out by this analysis highlights the way a student might perceive an advantage she has over other students by virtue of her past experience, in this case a course in formal logic. It often worked the other way – my classmates had the advantage of everyday contact with engineering principles and artefacts.

Commentary

At this early stage of the course, I was interested in my fellow students but there was as yet no sense of a community of practice. I was happy to allow this to develop: I had sufficient experience of social discourse not to rush things. There are, however, a number of comments about other students, particularly about areas where I felt insecure – “others had also struggled”. I have long been aware of this general response in students and frequently draw it out in introductory classes where students report feeling relieved that other people “seem to be worried about the same things”.

4.5.3 Example: Developing shared experiences

It is perhaps this silent noticing of what other people's responses appear to be that provides the necessary content for actions that do start to build up a community, using the in-group markers (Cutting, 2000) such as informal comments, banter and references to the developing shared experiences.

There is a hint in October of a concern about access to the social discourse – but also the start of an exchange of banter, particularly from Terry (the student who asked a lot of questions) and those who sat near him:

9 October 1997

Now labelled as class swot as only 2 people passed the learning outcome and I got a merit.

Journal Extract 9: Positioning and banter

Actions

It may only be one sentence, but this journal extract refers to a number of actions: **provide all correct answers to the questions set in the assessment; achieve the highest grade in the class; compare progress with other students (again); respond to banter from class mates.** The extract, though it is associated with some pride in my achievement, was mainly written to focus on the social relationships. Associated with the last action in that list are a variety of very culturally based and largely (though not exclusively) linguistic actions: **use banter/humour appropriately for the speech community; establish common ground with others in group; identify and avoid references that might cause offence; use tone of voice and body language to indicate acceptance of other people's teasing.** This list is not, of course, exhaustive but it does indicate a number of potentially difficult areas particularly for people with little social experience or adeptness, or who are not members of a dominant speech community.

Commentary

The achievement was for mathematics, a subject in which I had relevant experience though it was very rusty. I was aware at the time that my “merit” would not itself be a barrier to my social acceptance but I might have to be careful. Around this time, I

made an attempt to say I found some of the work difficult and this was met with mock derision: *"You get merits!"* I was not the only one finding labels for my fellow students. From observation, I recognised mock derision as a key feature of the dominant speech community in the West of Scotland (and many other communities, though not all) and I was comfortable with it but also conscious that it signified a mix of friendly teasing and an indication that I was under scrutiny.

Thus observations of the significance of progress relative to the rest of the class – obvious in myself from my journals – was also evident in comments from fellow students. It was a dominating issue before we became established socially. We appeared to be weighing one another up first, so that we could find our own points of reference. For each individual, there was access to the emerging discourse practices of the group, but while that group was forming, most of the individuals were cautious. The fact that one student had *"bottle"* seemed to augment development of a social discourse, at least judging from the number of early references in the journal to Terry and his interventions. I was, however, certainly conscious that too much *"bottle"* would also be alienating, particularly in someone who was already different because of gender and experience.

Exposure to social discourse within the cohort was therefore limited initially. There was no exposure at all to social discourse practices of engineers, although we did all experience these in our work environments and were eventually able to draw on them. This was an advantage that we had over the full-time students of the same course who came in during the day, and it should not be underestimated. Its effects are described in Chapter 6.

4.6 Conclusion

The thick descriptions of responses to exposure to discourse highlight the complexity of the situation that new students find themselves in. This chapter has shown from the inside how a student attempts to appear to respond *normatively* to a new situation, when in fact she is sometimes having to respond *creatively* (Fairclough, 1989).

As we were exposed to the different types of discourse, we attempted to make sense of them by drawing on our existing repertoires. Different types of meanings were important: meanings of words and symbols that we would have to use in the disciplinary discourse; meanings of practices such as completion of learning outcomes that would ensure our progress in the community of practice. We had to trust that the lecturers were exposing us to the necessary and appropriate meanings in both cases. It has also been shown that there were occasions when I (and my fellow students) had reservations about some of the discourse practices.

My own recorded actions relating to postponement suggest a desire to augment this exposure with additional resources – a point that becomes more evident in the next chapter. This could possibly be explained by my own integration into academic practices that lead to private inquiry into a topic; I am also conscious, however, that on some occasions it was associated with an intention to slow down the exposure to the discourses until I was able to cope with them.

5. Results (b): Barriers and Discourse

5.1 Barriers to, from and within discourse practices

The analysis so far has shown that when exposed to new discourses, I had to use my existing resources both normatively and creatively to negotiate with **meanings**, and to recognise how meanings are mediated through texts, artefacts and pedagogic discourse. I needed access to resources for such **mediation**, including appropriate **communities of practice**, and my endeavours were associated with “**outcomes**”, though this word itself had different meanings in the two communities of practice in which I participated. This chapter considers barriers relating to the development of meanings, mediation of action, achievement of outcomes and the establishment of a community of practice.

When I came to review the journal, many issues emerged that might be described as barriers relating to how I was able to respond to discourses. The barriers relating to discourse took a number of forms, however, as shown in Figure 5.1. There were barriers to my ability to **acquire** the discourse and **the discourse itself** presented barriers to progress. As the emphasis here is on the actions that form the response to the discourse, it is also useful to isolate barriers to the **appropriate actions** that I should have been taking. Thus, as well as deriving actions from data-as-text as described in Chapter 3, I am also observing how those actions are responses to *barriers* to action. In other words, even when there are barriers, there are also still actions.

Discourse type	Barriers to acquiring the discourse	The discourse as a barrier	Barriers to appropriate actions in responding to the discourse
Engineering	Time available for exposure. Inaccessible meanings. Perceived lack of exposure (e.g. to practical applications. Perceived exposure to non-relevant subjects.	Difficult ideas. Practices cause interference with other new practices. New contexts for old reasoning. Several meanings for one symbol. Resistance to discourse not perceived as relevant to engineering.	Interference from other practices. Gaps in knowledge. Missing steps and meanings.
Pedagogic	Absence of lecturer. Lecturer not perceived as "teaching". Insufficient time for lecturer.	Jargon and specialised meanings used but not explained. Mediation of difficult ideas. Mismatch between engineering and pedagogical discourse.	Lack of prerequisite knowledge. Student doubts about her ability; concerns about "halo effect". Lecturer "fixed" inappropriate student actions without explanation.
Institutional	Institutional discourse is tacit and mysterious. Resources unavailable to part-time students. Mismatch between expectations and actual experience.	Need to comply with (authoritative) norms even if regarded as meaningless. Discourse practices differ across institutions. Resistance to discourse/activity.	Lack of information on expectations and "what counts" (especially at university). Assumptions brought from other institutions. Not wanting to comply with norms.
Social	Poor social space. Few encouragements to interact. Short duration of contact (uni).	No common goal as class made up of several kinds of engineering student (uni). Mismatch between engineering and classroom communities of practice.	Not knowing people's names. Student's personal concerns about position in institution (uni).

Figure 5.1: An overview of barriers as identified in the journal

Figure 5.1 shows that these types of barrier intersect to some extent. Inaccessible meanings resulted in a lack of required meanings to support particular actions, even to the extent of encouraging the student to undertake actions that seem meaningless. Differing institutional practices resulted in the student acting on inappropriate assumptions. Similarly, there are intersections across the discourse types. Thus resistance to a discourse that the student does not perceive as “relevant” to engineering has institutional as well as disciplinary significance. These points will be highlighted in the examples in this chapter.

Despite these intersections, the distinction among barriers to, from and within the discourse practices is a necessary one. Each type of barrier suggests different types of response from the activity system, which in this case consists of the institutions and communities of practice that determine the discourses of academic mechanical engineering. These responses are considered below.

Barriers to acquiring the discourse: If there is a genuine barrier in terms of lack of exposure to discourses, people and resources, then appropriate action may be required from institutions and individual lecturers. The current study was prompted by a suspicion that students are not always adequately exposed to the discourses that they need. Adequate exposure to discourse, people and resources may need to be built into institutional and pedagogical planning.

The discourse as a barrier: Here the barrier is an inherent aspect of the activity. The identification of barriers caused by the discourse will provide information for the students and lecturers engaged in the discourse practices, (although there will be differing individual responses to such potential barriers).

Barriers to appropriate actions in responding to the discourse: A barrier under this heading is likely to be usually hidden from view because of its strong association with an individual student's processes of internalisation. This study aims to bring such barriers to the foreground. How the activity system should respond to this is a topic for later discussion in this and subsequent chapters.

All three of the types of barrier are considered in the following sections. These consider barriers associated with: the development of meaning for disciplinary discourse (5.2); pedagogic mediation (5.3); authoritative institutional discourse (5.4); the formation of communities of practice (5.5).

5.2 Barriers and engineering discourse: development of meaning

5.2.1 Barriers to, from and within the development of engineering meanings

Barriers perceived in relation to the engineering discourse were mainly to do with vocabulary, concepts and procedures. There were many references to problems in such areas, particularly at the start of the journal. Issues to do with vocabulary and signs were particularly associated with the heavier, new subjects: thermofluids, statics and dynamics, mechanics of materials, metrology and thermodynamics.

Procedures also posed problems in CAD and IT, where frequently there seemed to be a step missing and I did not know how to find it.

These issues were abstractions that had some relationship with the practical life of engineers, but there were several suggestions in the journal that there was a difficulty in relating the abstract to the concrete. This could be seen in my own wish for visual or practical demonstrations and an early request from Terry: "When will this become relevant?" In both cases, it seems that we were unable to find a way of understanding what a word or sign actually signified. It was clear from comments from the lecturers that although they were willing (at college) to go at our pace, there was too much to cover to spend a lot of time on exploring meanings of words and signs. There was therefore limited exposure to some of the required discourse practices, and there may even have been no exposure at all (though it is hard to be sure of the latter from my "insider" perspective).

In some cases, comments by the students suggested that they saw no concrete application for the abstractions in which we were engaged (as was shown in Chapter 4 in relation to quality management). This meant that the discourse itself presented a barrier. Other barriers from the discourse itself related to its difficulty and the likelihood of interference between apparently similar vocabulary and procedures. For example, the same letter could be used for a variety of symbols (see Appendix3). Another example is that once a procedure had become operationalised, it was tempting to use it in circumstances that were inappropriate. (I caught myself doing this in mathematics, for instance.)

The interactions between current understanding and the new meanings led to some difficulties in my taking appropriate actions. Two examples of these are illustrated below: problems with pre-existing vocabulary (5.2.2) and barriers to acquisition of new vocabulary (5.2.3).

5.2.2 Example: *Pre-existing meanings*

The journal records a day early in the course where I spent some time with dictionaries attempting to adjust some existing understandings of words such as “volume” and “pressure” and to consider the SI units associated with them, relating my findings to the exercise sheets from my class. I tried to answer my own question: *“What is the difference between volume and specific volume?”* and then moved on to: *“What units relate to atmospheric pressure?”* In the process, I began to explore a few of the units involved, noting with interest that some were named after scientists and philosophers (pascal and newton), a feature that was in danger of sidetracking me, but I returned to my theme. The extract below shows how concentration on one issue – SI units – can prevent “seeing” something else: the abbreviation for mercury (Hg).

My dictionary tells me... that

bar = 10^5 Pa

It also writes Pa as N.m^{-2}

but this is the same as N/m^2 (something I'd not have realised a week or two ago)

However, the question on the sheet has atmospheric pressure in mmHg and I still don't know what that means.

mm = millimetre = m/1000

Hg = ?

Ask for help with this.

I am much happier working by myself with dictionaries and reference books – ie putting the concepts into language I understand.

Journal Extract 10: Barriers to retrieving already existing meanings

Actions

This is a case that clearly demonstrates how, using Leont'ev's terms (1981a), the “operations” for an expert user become “actions” for the novice. Experts would not question the SI units used here; they would just accept them and work with them. However, there are meanings *within* these units – particularly to do with their relationship with other units. The main action here is: **clarify meanings of terms to be used in answering a question**. Subordinate actions include: **use resources (reference books) to identify meanings of expressions not understood; find ways of expressing relationships that can be used normatively; seek clarification on the meaning of any remaining terms**.

These might seem to have been appropriate steps at the time, but the explanation of the problem does not come from any of these actions. It relates to another, which might be obscured because it has already been absorbed apparently as an operation, that is: **assign categories to the terms to be used in answering a question**. My error came in assigning Hg into the category of SI units.

One way, then, of describing this problem is that my action of categorising created the barrier. It is important to note that the extract is about *already existing* meanings; I did actually “know” that Hg stood for mercury – I had learned the abbreviation at school; I had used it more recently in completing cryptic crossword puzzles that frequently draw on such abbreviations. I recognised it as soon as it was pointed out to me, and felt rather foolish about my error. I was later very surprised that it had taken me so long to recognise this abbreviation, but recognition did not happen until I spoke to someone else about it.

Commentary

It is tentatively suggested that this example demonstrates the value in considering “action” as a unit for analysis (though my own main unit for analysis is “what the student noticed”). There are, however, other ways of describing the problem identified in Extract 10. I shall consider two of them: **interference** and **taking a surface approach**, and compare each with the goal-based action analysis above.

In an earlier attempt at analysing this extract, I wrote about “interference” from wrong associations. Several associations are possible with one word or sign – newton is associated with a scientist as well as an SI unit; mercury is a planet, a Roman god, a substance found in household meteorological instruments and also takes its place in the table of chemical elements, when its abbreviation is used. The letter “g” can stand for many things including “gram” – an SI unit – which was not applicable in this case. In my earlier analysis, I suggested that the student must find the right association for the context. The fact that I already “knew” the right

association was not sufficient for me to bring it forward at the appropriate time. This, of course, is another way of saying that I had not given the expression the correct category.

“Interference” or “noise” is itself a socially constructed concept. It is a metaphor particularly associated with transmission and reception models of communication (see, for example, Shannon and Weaver, 1949), a perspective drawn from human artefacts. It does have some value – what was probably “interfering” in this case was a pattern established by the previous examples I had been trying, where defining terms and manipulating them through given procedures had worked very well. However, as a general approach to remedying such a barrier, the advice “watch out for interference” is probably less valuable and less specific than “make sure that you're using the correct categories”.

Another analysis might suggest that I was taking a very surface approach – focusing on the sign and not the signified. By just trying to find meanings of terms, I was not seeing the whole picture, which included thinking properly about atmospheric pressure – which, my existing resources would have told me, involves the use of mercury as an aid to measurement.

Even then, if I was focusing on the sign and given my evident pleasure in using dictionaries, why did I not just look up the abbreviation? I was using several dictionaries and one of them had conveniently provided lists of SI units and I was determined to find the quantity there. It is not recorded, but I think I probably looked up the abbreviation “H”, as I was so convinced that “g” stood for gram.

Academic staff do encourage students to use dictionaries – especially those appropriate to the discipline (a science lecturer I spoke to was exasperated that I had not used a “proper” dictionary to help me, that is a scientific one). However, even “proper” dictionaries will not necessarily provide the context that may be required and that is available in situated examples of usage (Brown, Collins and Duguid, 1989).

Again, observations about the surface approach have some value – especially if it leads to the advice “establish exactly what it is you are trying to do here” (which would be a better wording than “don't take a surface approach”). However, the student still needs to be able to use the correct categories as part of this process: the fact that I did not understand what I was being asked to do provided a barrier to undertaking the appropriate action, which was to determine the final gauge pressure of the oxygen in a vessel on the basis of the given information.

Perhaps a combination of advice might be: **“try to work out what situation is being described and consider what categories of information are part of the description”**.

As a heuristic, it is related to, though is much more complex than, the one given us by the lecturer – “write down everything you know” – which was a very useful one in the circumstances of the classroom. (In such a circumstance, “everything you know” about the problem is inevitably provided in a way that might not occur in the usage outside a classroom. It would also be more accurate to describe it as “all the information available” rather than “everything you know”.)

To be able to work out the situation, of course, the student is operating at fairly high levels of thinking. It also helps to have some relevant experience. Some of the other students later told me that they had no difficulty with this because they worked daily with vessels which used gauges to measure pressure taking atmospheric pressure into account.

The problem of accessing existing meanings can be seen several times in the journal. It also affects procedures and algorithms, where again there is “interference” from a pattern and an attempt to apply a procedure to something that did not belong to an appropriate category – a situation I described as “faulty reasoning”. There are also frequent problems with abbreviations, especially the letter “g” – see Appendix 3. The same letter is used for various different purposes in scientific formulations – and some books use different letters for those purposes. Students have to negotiate all these meanings.

5.2.3 Example: New words, new meanings

The situation with existing meanings is complicated in that “everyday” meanings may need to be developed or “restructured” because of understandings that are evolving. This process is seen in the next set of extracts, which consider both a new word “enthalpy” and the associated meanings of words that I already used, especially “heat”. I had missed part of a class, in which the students had possibly been exposed to some further discussion on the meaning of “enthalpy”. I found that I could not follow it from the notes alone.

30 September 1997

Enthalpy – heat content of a substance per unit mass [definition added later in margin]

I don't like working with an abstraction with an interesting sound name (enthalpy) without knowing its definition. I suspect the definition will be in terms of measurement – but I wonder whether I can give this label more of a concept.

19 October, 1997

Reviewing enthalpy notes after a week's "holiday" from college – but a very busy week at work.

Realised that it's probably worth trying to pin down some ideas into English again – eg does the everyday use of words like "heat" and "temperature" interfere with the process? Perhaps it could help – the fact that heat is a verb as well as a noun gives it an idea of change that isn't found in temperature. ...

These thoughts have been prompted by paying proper attention to the labels on the axes in the enthalpy diagrams – a real clue as to what is going on!

[There followed dictionary definitions (from more than one source) of "temperature", "heat", "energy", "enthalpy" and "entropy".]

16 April 1999

Learned a very simple thing from yesterday that seems ridiculous not to have pursued before but I didn't know where to start. Last year I simply did not understand the steam tables. Abbreviations got in the way again h_g = enthalpy of a gas and h_f means enthalpy of a fluid. The diagram we used for refrigeration explains it all.

Journal Extract 11 (compilation): Barriers to understanding enthalpy

Actions

These extracts from the journal highlight the role of time in actions that lead to development of concepts. The compilation also provides a warning that information about the situation perceived by the student at the time may not be accurately or completely described by her. It is therefore necessary to be cautious when deriving actions from this information. Thus one action, from 19 October, again relates to categories: **use knowledge of graphical representation** [labels on axes of diagram] **to identify important categories being used**. However, it is clear from the later entry that I still had not identified all the categories I needed, because meanings were

unavailable to me. Other (attempted) actions that can be derived from this selection include: **anticipate terms of reference for establishing a meaning** [measurement]; **revisit and clarify meanings of associated concepts; review and restructure earlier experience in the light of new information.**

Commentary

The combination of the letters “h” and “g” had again caused problems in my attempt to understand and use engineering terminology. In the end, in my dealings with steam tables, I had gone through the motions of practice without ever internalising the meaning, presumably by parroting some formulae.

There is no reference in the earlier journal entries to my being puzzled about h_g . I simply ignored this expression, but there is no sense now that I deliberately *chose* to ignore it. In other words, there was an *absence* of action in relation to a category that I did not understand. There is further evidence of such lack of action in the journal; in later entries I started asking myself questions such as: “*What does second moment of area actually mean?*” (Journal Extract 14 October 1998) and then discovered, somewhat to my surprise, that I had been happily working with the concept without feeling the need to question it at the beginning of that same year.

There had been a combination of such barriers: including a difficulty in understanding the idea of “per unit mass” and other new vocabulary such as “adiabatic”, “isothermic”, “polytropic”. Concentrating on the issues did ultimately pave the way for greater understanding, however, as suggested by the later extract in the compilation above. The moment of insight was helped by recognition of the

earlier difficulties. It was not a dictionary that provided the main step forward in understanding “enthalpy”, but an additional (and practical) application of the notion in an appropriate context. The barrier was removed when further exposure to the word/sign in context rendered its meaning clear. This is explored further in Chapter 6; for now the main point is that the barrier itself contributed to the meaning making – had I not had difficulties, the moment of insight would have been less marked. The most important issue, however, is that the barrier was only removed by new exposure in a slightly different context which allowed the meaning to develop.

My attempt to pin down a meaning through using a dictionary was not going to take me far in actual engineering discourse, which depends on the interplay of context and the culturally specific practice of engineers using the concept of enthalpy. Nor was the classroom practice (in this case) going to take me very far. In the classroom and in homework, we had simply attempted to do a few sums where certain relationships were brought together. My difficulties in this would have been no surprise to Vygotsky:

... the development of the corresponding concept is not completed but only beginning at the moment a new word is learned. The new word is not the culmination but the beginning of the development of a concept. The gradual, internal development of the word's meaning leads to the maturation of the word itself.

(Vygotsky, 1934/1987:241)

In the process of developing the word's meaning, the student will have to negotiate hurdles such as misleading associations and lack of association. In my own case, the entries highlight a danger of misassociations, which are likely to create problems later. As suggested earlier, there may be several ways of describing this situation – for example, interference in the “system” or taking a surface approach to learning. However, rephrasing the problems in terms of action – or lack of it – might be more fruitful at least for some students.

The student will look to the mediating discourse of instruction or pedagogy to help avoid such barriers. While the classroom may not contain examples of mature practice, it is a place where word meaning can be developed. However, there are also barriers associated with the pedagogic discourse and these are considered in the next section.

5.3 Barriers and pedagogic discourse: mediation

5.3.1 Barriers to, from and within pedagogic mediation

This section emphasises the barriers in the communication between a lecturer and student. It starts with an expanded list of the issues already given in Figure 5.1, because this is the area where the greatest number of barriers was identified.

Barriers to pedagogic discourse

- the prolonged absence of one lecturer meant *little* exposure to the necessary engineering practices; (some exposure came from other students who already had expertise in the subject)
- a lecturer did not use activities regarded as “teaching”; this student felt there were things missing such as (according to the journal) instruction, demonstration, modelling practice, working through examples, providing metaphors and analogies, giving feedback, entering into a dialogue
- a lecturer clearly did not have time to give adequate explanations of the concepts
- a lecturer used activities regarded as antithetical to teaching – e.g. this student felt that when the lecturer did the work for them or read notes aloud it was not “real” teaching and this attitude could be readily inferred in other students

Barriers from pedagogic discourse

- there was a mismatch between pedagogical discourse and engineering discourse – you just do this because it works or because the institution requires it (other students’ phatic responses indicated that they found this unacceptable at first)
- the language or symbols of the mediated discourse (engineering) was itself very complex and not easy to “transmit”
- the jargon and specialised meanings used without explanation prevented understanding of the concepts

Barriers within pedagogic discourse

- the student deemed herself incapable of working with some types of concept, specifically those connected with spatial awareness or requiring the use of sketches
- the student had fears that she was not responding appropriately to the instruction and was being “allowed” to get away with this.

Figure 5.2 Perceived barriers associated with pedagogic discourse

The above list is a long one, and two examples are used to illustrate the types of issue that arose in communications between lecturer and student. The first shows barriers to putting across abstract material (5.3.2); the second shows barriers faced by a student in her perception of the lecturer-student relationship (5.3.3). In both cases, there are problems in working collaboratively on this aspect of the activity, in creating “common knowledge” (Edwards and Mercer, 1987). The commentary thus emphasises the actions of both lecturer and student and the discrepancies and mismatches between them.

5.3.2 Example: Mediating difficult practices

Difficulties faced by the lecturers in communicating the engineering discourse practices to students were not necessarily attributed to poor teaching or lack of empathy in lecturers. The following example considers a lecturer who was regarded as very student-focused attempting to explain what appeared in my notes as: *“Divide by the mass flow when you get KJ/s to get KJ/Kg.”*

I did not write my journal immediately after the class as usual, because three of us decided we needed to go to the pub after such a complicated class. There we joked about the lecturer's ability to turn seconds into kilograms – which we felt was akin to turning water into wine. The following week I tried to remember the situation:

31 March 1999

Didn't record last Thursday's impressions at the time – which is a pity. (Went to pub after.)

Major impression/observation: Gordon [lecturer] was talking a foreign language to us but recognised this and acknowledged it, describing his own experiences of the mass flow energy equation when he had to spend hours on it. I plan to do this over Easter. Even though he demonstrated this empathy he also acted as though he assumed we were further on than we were. The notes for the assessment (drawn up by someone else) were wrong and he said “You'll think this is hilarious” and proceeded to describe the wrong assumptions. He got various responses to this: looks of bemusement; John: “yes I nearly kecked myself there” and Simon banging his head off the table. He thought it would be OK to show the notes to me (not a real student?) but I couldn't understand it at all...

I don't think the stuff will be difficult when I allocate time to it next week but on Thursday it was just a mass of letters. (And we'd seen it before last year.)

Journal Extract 12: Problems in supporting construction of meaning

The starting point for the associated “mass of letters” is shown in Figure 5.3 below.

The students had to work through several lines of calculation using this equation.

$$p_1 v_1 + u_1 + \frac{c_1^2}{2} + g z_1 + Q = p_2 v_2 + u_2 + \frac{c_2^2}{2} + g z_2 + W + \text{losses}$$

Figure 5.3: A mass of letters – the steady flow energy equation

Actions

The student actions in this case were associated with perceptions of staff actions.

She assumed that lecturer was attempting to: **provide a commentary on the process of engaging with the current abstract idea; explain the terms of steady flow energy equation; demonstrate how the relationships between the different elements of the equation can provide information about each other.** The steady flow energy equation is a clear example of an artefact produced by humans to describe a

situation briefly – but when they use it, students do need to have some understanding of what situation is being described.

The actions of several students are described in the extract – but these are mainly a record of the different manifestations of confusion. The “thin” description of what Simon was doing is: “bang his head off the table”, but the *action* (that can be readily inferred) is really: **display a lack of understanding and associated frustration**. He was doing this for the benefit of the lecturer, and, especially, the other students. The different expressions, particularly John's spoken one, demonstrate that students felt the need to: **display solidarity about the reaction to a confusing piece of information**.

The extract is not very explicit about the journal writer's own action – there is more concern with describing other people's and there is a strong sense of the social discourse at work here. However, there are some (recurring) themes: **postpone the attempt to understand** and also, though this is from memory, **conceal lack of understanding**. Despite the reassuring solidarity in the class, I was rather concerned that I did not understand the message, especially as I was singled out by the lecturer as someone who probably *did* understand it. This action prompted by the issue of my identity as a student, another recurring theme that was addressed in Chapter 3. One useful action that stands out is: **create a label for the problem encountered** (“turn kilogrammes into seconds – like water into wine”), though this is *post hoc* and not evident in the extract itself. However, it raises an important issue which is discussed in the commentary below.

Commentary

The lecturer's attempts to help us through a difficult lesson by adding a commentary on it did not *immediately* succeed in helping us to construct meaning from the “mass of letters”, though it did make us pay attention. It is difficult to present scientific information that appears to be “dehumanised and dogmatic” (Lemke, 1989). Even by making jokes, the lecturer was not able to humanise the point he was trying to put across. Lemke explains why we had problems and the likely effects of those problems. He and his fellow researchers found that:

students are three or four times more likely to pay close attention when teachers do break away from the “official” language of science. But teachers and pupils usually signal that these breaks don't belong to the serious business of the lesson, aren't really scientific... The break emphasises by contrast that the real science is still the dehumanised one.

(Lemke, 1989:33)

Lemke sees this as a regrettable situation, alienating students and the rest of society from science. It is telling that in the example being considered, the journal and memory both highlight the “human” aspects of the situation and not the core of the problem nor its resolution. The lecturer had clearly succeeded in engaging us, though had apparently not been immediately successful in “transmitting” his message.

Later, when I asked another student – Terry – if he had understood turning kilograms into seconds, he said that he had understood the reason but not the justification. I

eventually asked the lecturer to explain again and *“when he did I saw that it related to the 'specific' nature of the units – almost the other way round from my original problem with specific.”* (Journal Entry 14 April 1999). This entry suggests an understanding that might be expressed in inner speech (Vygotsky, 1934/1987; Bakhtin, 1981), but was not quite available in words that I could write down for future reference. I do not fully understand the notion now, though a partly-formed understanding remains that relates to how the equation represents a concrete situation. However, it is possible that if I had eventually come to be familiar with the steady flow energy equation, my “inner speech” would incorporate a reference to our amusement at turning kilograms into seconds and that this would in fact assist the understanding.

This jointly constructed label for one action (“turn kilograms into seconds”) – suggested by someone and exaggerated in the discussion in the pub afterwards – became a useful reification of the problem. The joke actually helped to identify one of the key aspects of the equation – how relationships between variables can be manipulated to provide additional information about each of them.

This particular lecturer recognised the dehumanised language as a barrier, and he frequently used metaphor, analogy and demonstration to assist our understanding. There was no such support available in this case – as he knew himself because he had had *“to spend hours on it”* – and he did the best he could to humanise the issue. If I had continued as an engineering student, I suspect I might ultimately have been grateful for this attempt, but I have no way of knowing that this would have been the case. Nevertheless, my fellow students and I were eventually able to complete the

assignment associated with this equation, which does suggest that we were working in our Zone of Proximal Development – that is, we could succeed with the support of our mediating lecturer.

5.3.3 Affective issues in the pedagogic relationship

The student's own role in the pedagogic relationship also gave rise to barriers – especially, in my own case, if the student felt she was not being a “proper” student (a position hinted at in Journal Extract 12 above: “*not a real student?*”) and referred to in Chapter 3.

Journal Extract 13 illustrates a barrier that is attributable to the lecturer-student relationship – a concern about favourable treatment. In such a case, the “support” available from the lecturer is perceived to go too far. It is a recognisable issue for both staff and students and one that can lead students to be suspicious of the whole situation, whether it specifically benefits them or not.

5 November 1997

It occurred to me that the lecturers would feel uncomfortable if I failed.... I was a bit concerned that Mike [lecturer] decided 4/6 would do for a pass & that's what I got.... It's perhaps a rather self-centred worry; nevertheless the “halo” effect is well documented.

Journal Extract 13: Concerns about the “halo” effect

Actions

This reflection involves an expression of feeling which derives from an interpretation of the situation. In action terms, this might be worded: **describe the situation in a**

way that suggests personal advantage and/or attribute reasons for a lecturer determining what should pass or fail. The affective aspect, kept private at the time, nevertheless was available through the journal and related to both a view of human interactions and to a reified concept – the “halo” effect, which relates to favourable judgement of a person on the basis of pre-existing action or impression. The private action is still therefore infused with sociocultural meaning: **express concern about the validity of judgements about oneself.** Although it was a private action because no one else would read this entry, the motive was to express the concern with a view to attempting to allay it. This action, I suggest below, is a very common one in students and is not always confined to private journals.

Commentary

It is important to acknowledge affective issues in relation to activity and action and to Vygotsky's ideas about the development of thought, though these are often underplayed in analyses of Vygotsky's work (Blanck, 1990; Mahn and John-Steiner, 2002). While both Vygotsky's work and the work of the activity theorists who followed him do emphasise cognition, behaviour and praxis there is still evidence of emotion as a necessary factor:

The affective and volitional tendency stands behind thought. Only here do we find the answer to the final “why” in the analysis of thinking.

(Vygotsky, 1934/1987:282)

The emotions are seen [in Leont'ev's activity theory] as a constituent of personality; they reflect the relations between the motives of the

personality and the possibility for their positive realization in the social world through activity.”

(Axel, 1997:139)

Thus my concern about my relationship with lecturers (and also with fellow students) played its own part in providing the motive for particular actions.

There were several mentions of the “halo effect” in the journal. I thought that my being a lecturer might predispose lecturers to expect me to perform well. Having been expected to get 100 per cent in the Mathematics class, I wondered why the same strictures did not apply in our other class. I thought perhaps that an adjustment was made simply to allow me to pass. (I revised this view on later reflection, thinking it unlikely that such a step would have been taken.)

The full version of this extract also contains observations about my own lecturing experiences and awareness of favouritism as a potential issue. It is an issue on which many students comment to me as a study skills adviser too. If it goes in their favour, they think they “only” passed because the lecturer was being kind; if it goes against them, they think they have failed because the lecturer does not like them or other students have been favoured over them. It is perceived as a barrier in either case because success in the course should not depend on whether the lecturer likes the student or not. Regardless of the “truth” of such attributions and whether or not the result is favourable, the student feels separated from the practices she is trying to appropriate. She has no control over her access and participation. In an extreme

case, the student may feel that her actions will make no difference and so there is no genuine participation in the overall activity.

The example also suggests an issue that may be associated with actions around the “reification” of an abstract idea, in this case, the “halo” effect. Other examples of this can also be found in the journal, notably the description of myself as “field dependent” (someone who processes information globally – or, to put it informally, sees the wood rather than the trees). I “caught myself” attempting to use this “label” to predict that I would not be able to do technical drawing. I was saved from the prediction by making a connection between the line of reasoning and the labels I have seen other students attribute to themselves, and also by discussing the implications of field dependence with academics who knew about it. Many students would not have access to such resources and many will keep their self-assessment and the associated actions to themselves, as I did with the “halo effect” notion.

I also made similar observations about deep and surface approaches, but these were more complex as I had already started to question them as labels: *“I wonder whether a deep or surface approach has any connection with acquiring discourse practices.”* (Journal Entry 4 March 1999).

In my professional life, I have heard a number of students refer to such labels, using constructions such as: “I am not the sort of person who...” and “I’m here under false pretences because...” These formulations can have the effect of shutting off further participation. They are frequently associated with the student’s view of themselves as a person who does not fit into a particular type of institution and can also be

associated with an expression of surprise to “find myself at university”. They are therefore issues deeply related to a student’s sense of identity. When students express their fears to a study skills adviser, however, I would suggest that their motive may be to have them allayed. This does not mean that they are not genuine fears.

5.4 Barriers and institutional activities: authority

5.4.1 Barriers to, from and within authoritative institutional discourse

It only really occurred to me that there is an institutional discourse (separate from the pedagogic) when I made the transition from the FE course to the HE module. One barrier to appropriate activity in response to institutional discourse is therefore likely to be lack of awareness about it, though students do make frequent observations about their institution. When there are barriers *to* the discourse in this way, there will inevitably also be barriers *from* the discourse. In this case, the barriers are exacerbated by the authoritative nature of the discourse. This issue is discussed below before a consideration of examples of student actions in response to it.

Higher Education has frequently been associated with hidden or implicit practices: for example, the “hidden curriculum” (Snyder, 1971); the “institutional practice of mystery” (Lillis, 2001). The lecturers in FE hinted that we would have to find our own way in this mystery if we went on to university: “*We spoonfeed you at college.*” This statement was made by one of my lecturers and I have heard it many times from direct entry students at university.

A university is itself the site of multiple discourses (Barnett, 1997) with much greater complexity than those identified here as happening in a classroom setting – for example, the institution is engaged in political and marketing discourses that relate to its continuity. Such discourses, however, have little obvious or immediate impact on students, beyond reading a prospectus. Students are most affected by the institutional discourse associated with their ultimate qualification: the credit, and its value. This is reflected in the perceptions about institutional discourse derived from the journal, particularly relating to problems of expectations of the institution from the students and vice versa.

There was a specific issue for part-time students: some of my fellow students (on both courses) complained about lack of availability of resources that day-time students enjoyed.

While the institutional discourse was masked to some extent, it could still provide barriers. It was not only the contrast with FE that highlighted institutional discourse, it was the invocation of the university as an authority. This was exemplified when one of the lecturers criticised the class for not following conventions: *"The University does not like you to submit assignments in pencil."* He also made it clear (after several assignments had been submitted) that the University expected students to put a front cover on their assignments – and that they should have learned to do this in their previous institutions. (Most of the students in this evening class were direct entrants from a college; only a few had completed first modules with the university.) Failure to comply with expectations had resulted in a loss of marks. When it is "the University" that requires a student to comply, then there can be no

argument about it if the student wants to remain a participant. The “authoritative discourse” of a university is sacrosanct:

The authoritative word demands that we acknowledge it, that we make it our own; it binds us, quite independent of any power it might have to persuade us internally; we encounter it with its authority fused to it.

(Bakhtin, cited in Wertsch, 1991:78)

This section looks at the implications of authoritative discourse as a barrier: what its constraints mean for student activity and especially in terms of the “learning outcomes” we were expected to achieve. It uses two kinds of extract from the journal. First there is an example that highlights a potential result of responding without internal persuasion to institutional discourse (5.4.2). In the following subsection (5.4.3) there is a compilation of evidence suggesting that such lack of persuasion might have alienating effects on students, such as those described by Mann (2001) (see Chapter 2).

5.4.2 Example: *Unthinking compliance with perceived activity*

Journal Extract 14 indicates a particular type of barrier to institutional discourse around learning outcomes – one relating to the meaning of tasks. As part of an “outcome”, we had been asked to state Newton's second law of motion.

3 March 1998

Peter [student] has missed a couple of sessions and was doing an earlier outcome. I helped him a bit as he didn't have the right notes. I pointed out that the 2nd and 3rd laws of motion had been written the wrong way round. He then proceeded to copy them all out & even wondered if he might get extra marks. (I pointed out he might lose them!) It was interesting trying to see if I could still do the outcome I'd passed, but I didn't help a lot. He must have got through anyway.

Journal Extract 14: Barriers and outcomes

Actions

Here there is evidence of collaborative action, which strictly speaking should not have been allowed as an assessment was involved. The assessment was, however, open book and the lecturer was happy for me to give Peter my notes. It certainly would have been unfair to let him think that the order in which the laws of motion had been presented in the handout was correct, but by pointing this out I was also alerting him to where the answers to the question could be found. This point adds to the complexity of the actions that can be seen here: **identify a source of material that answers the question in the task; alert a fellow student to an error in the material; reproduce written material in answer to the question; identify the scope of the question; relate quantity of information to the expected outcome; review a procedure previously carried out.**

The main action: **(provide what is required to) pass a test** subsumes some of the others as actions and operations – but because of the context, even “copy or reproduce written material” has the flavour of an action rather than simply an operation. There is an intention to give the lecturer a reproduction of the written material he is assumed to want. Some of these actions and operations were jointly carried out and some belonged to either Peter or myself – it is actually hard to separate the two, however. For example, we both related quantity of the information

to the expected outcome, though initially we came up with different conclusions. (I am not sure whether or not I persuaded Peter that providing three laws was not, in this case, an improvement on providing one. It probably did not matter in terms of his progress in the assessment.)

Commentary

The main point to highlight from the above extract is that Peter did not see the task as having any meaning other than providing what was required for a test. He realised that to get through the task he had to copy something from his notes. (This was apparently legitimate, as it was an open book test.) He thought he might get extra marks for copying more than was requested – perhaps because it would seem that he “knew” more. Often, when the outcome was that we could “state” something, it simply meant we had to copy it. I had already achieved this outcome – which did involve much more than copying a statement – though it is interesting to note that I had some doubts as to whether I could repeat the performance.

Students may feel they have to engage in “obedient purposelessness” (Perry, 1959) if it is going to get them the qualification they require. *Actual* outcomes might include:

1. products that appear to be in the appropriate discourse style (but which may have been imitated or plagiarised)
2. an increased ability to follow instructions (but without understanding them)
3. single demonstration of a practice (but which may not yet be repeatable).

While such results would not appear in any list of institutional learning outcomes, they could well be acceptable evidence that the student is in the “Zone of Proximal Development” (Vygotsky, 1934/1987) that will eventually result in those desired institutional learning outcomes being acquired. Peter and I may not have been very adept with the application of Newton's second law of motion, but at least we knew it existed, where to find out about it and, with support, which algorithms to use in relation to it.

5.4.3 Example: Resistance to activity

One side effect of authoritative discourse which encourages obedient purposelessness and an unquestioning acceptance, and discourages internal persuasion, may be that students (and also, arguably, lecturers and institutions) “play the system” to provide the appearance of actions and even “activities” that comply with the norms and expectations laid down by the institution. Bearing in mind that the use of “activity” here does include inner persuasion, motivation, affect etc, this is potentially a very strong accusation. It suggests that in their behaviour and products students imply that they are engaged in particular activities and actions subordinated to the central activity of tertiary level education in mechanical engineering, and including the “target” activities of professional practice, but they may not be. Journal Extract 14 presents a compilation of some tentative evidence from the insider perspective that this is indeed happening. Though it is a strong accusation, it does reflect some current concerns in tertiary level education, especially relating to plagiarism.

29 January 1998

I can see what will happen here; because of problems with the teaching there will be some shortcuts taken, eg people will copy each others' diagrams. Most seem to be genuinely trying to understand but the lack of teaching and problems with discs and hardware are causing immense frustration. There is a lot of peer support, though I didn't draw on it myself today...

19 February 1998

Sean [college technician] very helpful, coming round and checking people at an appropriate frequency. Helped me but made me do for myself & was also patient with what must have seemed like colossal ignorance. I should manage to get through but definitely don't know what I'm doing in terms of drawing. This is a clear case of being outside the community – but perhaps gaining an HNC will put this status in an odd light.

5 March 1998

Finished CAD – though not merit question. Some dissatisfaction among students about this module. One told me I shouldn't have handed my work in but just copied one of the others & changed the name....His justification for this was that we hadn't been taught properly – the implication being that if they don't teach us properly it serves them right if we “steal” the qualification.

Journal Extract 15 (compilation): Misrepresentative or misappropriated qualifications

Actions

The main action here is: **present an answer which appears to show that I have understood what I am doing**. There appear to be at least two routes to this; one feels less “legitimate” than the other. My own response was **ensure that the final product appears as it should do** which did entail that I had to **make a judgement about how the final product should appear**. The less legitimate version of this – **present someone else's work as one's own** – includes an intention to cheat but also a justification of it. At one level of “thickness” of description, the two responses seem fairly similar. The difference between “**cheat**” and “**pretend that the work represents understanding**” has clearly evolved historically through sociocultural

practices. Such a fine distinction is also likely to be different in different cultures where the evolution may have taken different turns. “Cheat” is a derogatory term more likely to be applied to someone else than to one's own action or activity. (The students in my class used it occasionally with a mild irony, commenting that they were “cheating” when they were undertaking a collaborative action in a manner that was usually treated as acceptable in the class.) In the example above, the action seemed to be describable as: **use whatever methods are necessary to salvage what I am entitled to from a situation.**

The compilation shows a developing concern over time about the misalignment between actions and expected outcomes. It points to potential problems with students’ engagement with the target activities and discourses of their course.

Commentary

There were various problems with the module on computer aided draughting. The lecturer was off ill for most of the classes and the college managed as best it could to cover him, but we had to work on our own much of the time. One student, Bill, was already an expert and did much peer support, but a group of us who were not sitting close enough to him started to get behind.

This set of examples highlights the difference between barriers and lack of engagement. Like my peers who (may have) cheated, I now have a certification of learning outcomes in CAD that should be evidence of some competence but is not. In this case, I was able to engage in those discourse practices that would allow for this achievement, but not those that truly represented what the achievement certifies.

There were barriers preventing my own full engagement; the type of copying that was proposed by some students, however, indicates a disengagement rather than a barrier. The end result in both cases is a qualification that misrepresents levels of performance.

In my own case, despite the “success” there was also evidence of alienation from aspects of the discourse and a determination to get through without any real understanding. This was also observable in other parts of the course, though the practices did not “feel” so alienated in those cases. It would appear that there is a spectrum of practices, only some points of which are illustrated in Figure 5.4.

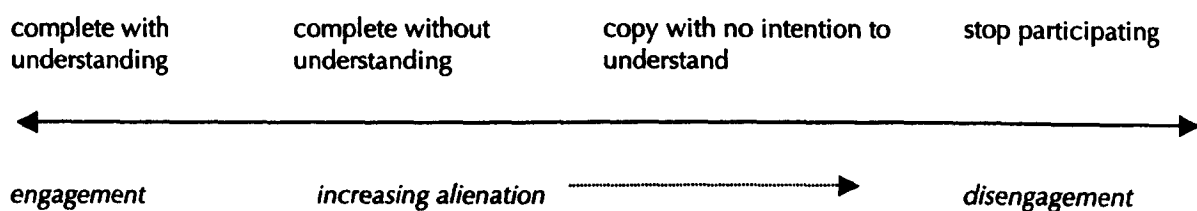


Figure 5.4: Activities showing increasing levels of alienation

When machines break down or there are other reasons for not being able to comply with requirements (such as absence from a class), the student's focus may shift from "learning" (acquisition of discourse practices) to getting through the course. I would suggest that it may be very unusual for a student *never* to experience such a need for compromise. In my own case, for example, I had to prepare a lab report for a metrology lab I had not been able to attend because of personal circumstances. I used other students' results (and not their full reports) but the final product had the

required appearance of a report of an event at which I had been present and taken the measurements.

The experience of being an “insider” has made me review my responses to plagiarism and other forms of “cheating”, although I still try to steer students away from it. The greatest difficulty comes in persuading students that it is not a good idea when they see that so many of their classmates do it and get a better grade than they do. Some very fine distinctions come into play with the differences between plagiarism, citation, and using other people's “voices”; the dichotomy between thin and thick descriptions highlights the issue here. Plagiarism is also an issue that foregrounds the role of intention in determining what an action is.

The main point that this section is making is that the very inflexibility of institutional “authoritative” discourse leads to a kind of “pseudo-discourse” where participants give the impression of full engagement in an activity or action when they are not actually equipped to do so. Many commentators – especially neo-Vygotskian ones – would describe this as a stage on the way to understanding; the institutions themselves, however, present an image of accreditation of completed understandings. That they do this so authoritatively is one of their strengths and means of survival.

5.5 Barriers and social discourse: community

5.5.1 Barriers to, from and within the formation of communities of practice

There are no records in the journal of any obvious barrier relating to social discourse. However, reflection on the situation suggests that there were in fact a number of barriers, particularly for the direct entry students in the university module. Again, these were barriers to, from and within the discourse.

Neither the college course nor the university one particularly encouraged social interaction at the start. There was little social space – at the break, students gathered around coffee machines on a landing or stayed in the classroom (college) or sat in a darkened unstaffed refectory (university). An additional barrier to social discourse in the university was time: we only met once a week and just for twelve weeks.

The social discourse itself did not seem to be that of a group of engineers. This was particularly noticeable as we did not share a common goal; the module was a generic one for engineers and so people were fitting it into their programme for mechanical, electronic, chemical or computer engineering.

In both the college and university, the classes were small (around 16). It took me a long time to get to know people's names and I never did get to know everyone on the university module.

The additional personal barriers for the university module had some bearing on my membership of the community of practice and it is this aspect rather than social

interactions themselves that is highlighted in the examples for this section. It was clear to the other students that I was a member of staff in the institution and also that I was a close colleague of one of the two lecturers. This undoubtedly made me “different” in a way that my experience and gender did not at college. Lecturers and students may be participating in the same community of practice; however, the asymmetrical “pedagogic relation” (Bernstein, 1990) between them means that a student who is seen to belong to the lecturers’ “camp” will not be easily assimilated into the social group of students. At least, that is how it appeared to me both at the time and on later reflection, so it was certainly a perceived barrier. A compilation of extracts from this time shows concerns about my membership of the community (5.5.2). Other students also questioned their membership of the community, comparing it unfavourably to other practices, and a couple of extracts are used from the HNC to illustrate this (5.5.3).

5.5.2 Concerns about membership of the community

The compilation in Journal Extract 16 indicates some of my issues during the university module. They pick up on some of the barriers already raised in this chapter but present them from the perspective of being a member of a community of practice (a metaphor, “label” or “reification” that I was using myself quite a bit by this stage).

4 October 1999

Before new class

Not quite so anxious about this class. I already know a student and the lecturer. But just realised I haven't brought a calculator or possibly other things I need. I am not back in "engineering" mode at all.

10 October 1999

Trying to do homework for Engineering including for the week I missed. First reaction – I couldn't possibly do this and I'm going to get rumbled as a fraud. (But they all found it difficult.) Then spent some time thinking round the problem, flicking through books and trying to visualise a mechanism that would do this.

29 November 1999 [reflecting particularly on group project]

Quick note...now anxious student about letting team mates down and about general inadequacies in whole area – even leading me to copy a couple of lines from book, much to my embarrassment! (The day I only had a couple of hours to do everything in.)...

One thing I was just thinking about – I wondered if I should find realistic prices for aluminium, plastic and steel. But that doesn't seem to be what's required as much as a realistic thinking through what we're going and justifying everything. So the actual findings don't matter – just the processes we go through to get to those findings. This is different from the way it is in industry where the actual findings are important – how you get to them possibly less so as you have become an expert.

8 December 1999

Have been thinking for the past few days about how I am looking forward to not being a part of the engineering student community any more. This is naturally partly because I want to decrease a level of work that is causing me stress but also partly because my participation is now possibly becoming more peripheral. As I should be moving further in from the periphery, I find my response to "call yourself an engineer" is now "but I'm an impostor".

Engineering is undoubtedly a very masculine environment – something I have denied as significant. But there are clues such as in "most guys will have used a hacksaw" [said by a lecturer] that make me feel that a forty seven year old woman with little practical experience or inclination... will never make it into the community.

Journal Extract 16 (compilation): Perceived barriers to membership of a community of practice

Actions

Many of the actions represented in this compilation are the reflective type that are generally kept private but are actualised in the reflective journal. An overarching action, represented throughout and developing in intensity, might be worded:

determine an appropriate level of participation in the community of practice. As the period of the study draws to a close, goals underpinning the actions relate to leaving the community of practice but with a sense of achievement (in fact, the journal explicitly states this). Actions associated with barriers include some already seen: **use resources to identify meanings of expressions not understood** (trying to find a way into the appropriate practices of the community); **conceal lack of understanding; present an answer which appears to show that I have understood what I am doing** (and in this case, does not reflect what the “real” situation would, but is acceptable to *this* community of practice); **present someone else's work as my own** (copying from a book – I did not even realise that I had done this); **use a label/description** (e.g. fraud, impostor) **of myself to predict failure to participate fully in a community of practice.**

Commentary

There is evidence here of a student getting ready to disengage from the activity of tertiary level education in mechanical engineering. In educational activity, preparation to disengage can involve heightened levels of action to ensure that the qualification is achieved. However, such actions – though energised by the activity – may not be an adequate representation of it nor map on to the target activities of the discipline. Last minute cramming for an exam, for example, does not seem to have much to do with what engineers do once this phase of their apprenticeship is over.

5.5.3 Example: *Alternative communities of practice*

This chapter on barriers has been highlighting the ways in which students respond to inaccessible meanings, authoritative discourse and the activities of the other participants in the community of practice. The two communities being described here – engineering students and staff in a college and in a university – allow certain practices and not others as part of participation. In particular, the chapter has demonstrated that in such institutions, it frequently happens that students display written and spoken discourse, artefacts and practices that *suggest* certain actions and even activities. These activities are based on motives and meanings resulting in actions that the student only appears to be demonstrating – the insider view confirms that there are other actions occurring.

It might be argued that this is only the experience of one insider and one who by her own admission is not a “natural” member of this community of practice. It is, however, possible to infer from observations about other students that they were also engaged in similar responses to the community of practice.

6 January 1999

T asked me (again) what I'd charge for writing essays and when I laughed he said “I'm serious. I'm not into this at all. It's all bollocks.”

27 January 1999

At break – eavesdropping. “It's not the type of mechanical engineering I do. “ “Me neither.”

Journal Extract 17: “I'm not into this”

Actions

The action inferred from the students' statements above might be worded: **seek ways of appearing to perform a required action without actually doing it** (or, possibly, “cheat”) and **relate the activity to other activity and make a comparison** (unfavourable). There is also a tacit action here: **compare the actual course to expectations of it**. In addition, there is an implication in the second comment, thus: **suggest that there are other communities of practice that have better ways of doing things**.

Commentary

The observations in Journal Extract 17 serve as a reminder that there are other communities of practice that work in similar areas and that have different activities. It is clear that Terry did not value the practice of “writing essays” (though it was actually an engineering report and not strictly an essay). This is an issue I frequently discuss with engineering students, many of whom feel strongly that they should not be expected to engage in such practices. Some will invoke the practice for which they feel they are being “trained” at university and tell me that “engineers don't write reports – they get other people to do this”. In my professional capacity, when I suggested to one such student that this was something he had to do to demonstrate that he was part of this particular community – that being able to express yourself in this way was part of being an engineering graduate – he told me that he hoped that he would forget how to do this once he had graduated because he hated this type of language.

There are signs here of students “on the edge of a discipline” deciding that it is not for them. Sometimes this situation can be overcome, especially if they are supported in seeing the relevance of the particular actions to their future activities and practice. If there are a few such actions that have to be undertaken for the sake of it (and some lecturers did point out to us that some of the things that we were doing did not happen in industry any longer), it is perhaps possible to live with it. The students involved in Extract 17 all went on at least a bit further with this community of practice.

Many of the barriers identified in this chapter were eventually overcome.

5.6 Conclusion

Disciplinary, pedagogic, institutional and social discourses have provided a framework for considering barriers to the students. A key issue to emerge from the analysis is the suggestion that students may appear to engage in certain actions though they are not actually doing so as they do not have access to the required resources. Many of these actions would have the status of activities when viewed as part of actual engineering practice – for example, report writing. Such actions therefore relate to target activities and discourses.

It is difficult from the insider perspective to make observations about resources that were missing. Some students make judgements about this; in engineering, a view is frequently expressed that there should be more practical work and less “English”. Some lecturers also comment on the need for practical work – the journal makes

some reference to this from lecturers in my own institution – but tend to be adamant in their view that engineers have to be able to express themselves adequately.

One first year student in my own institution told me that he kept pestering relatives to find out about engineering practice and that he really looked forward to his placement year so he could understand more. This concurred with my own feeling that I would find it helpful to see the issues in their natural situation, that this interaction between the concrete and the abstract would support the understanding of both.

If taken to an extreme, barriers will result in alienation from the discourse practices, seen in lack of participation or a parody of participation that may involve actions that are regarded as “cheating”. However, dealing with barriers is an essential aspect of engaging in new practices and overcoming them plays a role in progress with the discourse. This is explored in the next chapter.

6. Results (c): Progress with Discourse Practices

This study is not only concerned with barriers; responses to discourse should also indicate development and progress. It will be useful to explore the actions associated with progress towards acquisition of the target discourse and engagement with target activities (that is, those pertaining to mechanical engineering) as well with the activity of tertiary level education in mechanical education.

Progress is an important issue for tertiary education. Student progress is associated with the retention of students, the quality of teaching, the reputation of the institution and even the continuity of the institution. It has a wider societal impact with reference to activities that graduates are expected to engage in. A student's perspective on progress will thus only be one part of the picture. However, it is a part that deserves consideration in greater depth than can be found in the literature. The process described in Chapter 3 of using the data-as-text to derive an account of student actions attempts to provide this perspective. This chapter first considers a comparison of my official progress in the modules, and my own perceptions of how I progressed with the discourse practices of each module (6.1). I then make a chronological review of journal extracts from times where I felt I had made progress towards the target activities of engineering (6.2).

6.1 Introduction: progress within the modules and discourse practices

My assessment experiences in further education should have been very similar to those of other students across the country. In Scotland, the practices were governed

by the Scottish Qualifications Authority (SQA) who determined what the “learning outcomes” should be and also provided “performance indicators” and “range statements” to go with them. There were two possible awards: pass or merit, with merit awarded for excellent or additional performance.

Students who had entered directly into second or third level in the university where I worked at the time told me of varied practices with respect to merits in their different FE colleges. “Everyone got one.” “If you needed them for university, you got them.” (Some university courses specified that a merit was required for university entry.) I did not see this kind of practice at the college where I studied, though there was certainly some inconsistency in the award of the merit. This can be seen in Figure 6.1 overleaf where I compare my “official” progress with my own perceptions of my progress. I acknowledge that my own perceptions are limited; nevertheless, the comparison is useful for a study of how a student might respond to the discourses of tertiary level education.

In some subjects, such as Mathematics, merits were very clear cut. Students were expected to get 100 per cent in Mathematics, but they could have more than one attempt. If they had problems with one part, they could resit questions on that part only. Getting 100 per cent first time resulted in a merit. In other subjects, there was a separate question for a merit. This was supposed to be the case in CAD, for example, but as there were problems in the teaching of this topic, there was no-one available to give out the merit question. This was an issue that resulted in many complaints from students. It did not affect me as I needed all the time available just to obtain a pass. No-one got merits in IT, Communications or CAD.

Module	Grade	Student perceptions of progress
Thermofluids	Pass	Despite some problems with this subject, I “got” or “just saw” the notion of conservation of energy.
Mathematics	Merit	I initially made a number of erroneous assumptions; I persisted in working with examples until I understood the correct procedures.
Statics and dynamics	Merit	I occasionally felt I could “just see” what was going on, for example when considering conservation of momentum. Though that effect disappeared when I began to make calculations.
CAD	Pass	I tried to understand technical drawing as well as the use of the software package. In the end, I had to just make sure I was reproducing the lines expected of me.
Communication	Pass	This is my own subject area. I might have been expected to do better than this, but none of the students got a merit.
IT	Pass	Some useful skills were involved here; in some cases, I only appear to have acquired them. The “evidence” of success in the print-outs depended on the lecturer’s actions rather than my own.
Mechanics of Materials	Pass	My awareness of some engineering concepts increased during this module, when I began to question formulations I had previously used without thinking about them.
Metrology	Pass	I had to resubmit some work on interferometry. I gained a number of new concepts and an overall awareness of issues relating to accuracy of measurement.
Quality Assurance	Merit	I built on some existing knowledge and gained some new concepts and procedures.
Thermodynamics	Merit	I revisited some former topics, this time with increased understanding.
Project	Merit	I worked through difficulties with concepts relating to aerodynamics, despite a temptation to plagiarise at the point of understanding.
Engineering Design (university module)	A	There were six assignments and two tests that did not suggest I would get an A. However, the team project pulled the mark up. I could offer report writing skills to the team; the other two members had a skill with figures and a skill with drawing.

Figure 6.1: Progression with the modules of the course

The university had a different approach to assessment. There, it was up to the lecturers to determine what would be in the assessment. The grading was standardised: A to E grades were awarded with D and E being fails. These could be correlated to percentage points, when, for example, C was given for a mark of 40 to 49 per cent and A for 70 per cent and over. There was therefore more opportunity to discriminate between students' performance in the university course.

Figure 6.1 suggests that the student's perceptions of progress with the subject do not necessarily relate to the progress recorded by the institution. In some cases, especially in IT and CAD, and to some extent the university module, the evidence of progress is not what it seems. In others, especially mechanics of materials and metrology, I did not excel in institutional terms but seemed to make personal progress with some of the ideas and concepts of engineering. This personal view of progress with the discourse practices is further explored in the following section.

6.2 A chronological review of actions that contributed to progress

The selection of journal extracts in this section highlights the developmental nature of the response to the discourses, though this sequencing may suggest more structure or hierarchy than was actually present. The examples chosen give the lie to this; often "progress" in one area occurs at a time when other aspects are not going so well. Some of the selections chosen to illustrate the points may therefore seem incongruous: this is acknowledged and incorporated in the discussion. However,

there is an overall development discernible through the journal, culminating in the student seeing the world in a slightly different way.

The treatment here differs from the previous two chapters in that only one action is drawn from the journal extract and discussed. Though there are other actions going on, attention is drawn to the action that is associated with progress. Figure 6.2, which is a full list of the actions, and also the headings of the subsections, illustrates a progression towards the target activities and discourse practices of mechanical engineering. There is a subsection on each of the actions in Figure 6.2 and each subsection contains a brief introduction, a journal entry and a commentary.

1. Follow set procedures
2. Imitate lecturer, text, fellow students
3. Recognise errors
4. Compare practices
5. Recognise a specific procedure
6. Identify principles of a subject
7. Fill in gaps
8. Discern variation in ideas and artefacts
9. Give and receive peer support in a community
10. Discuss abstract ideas
11. Discuss engineering as a novice engineer
12. Question and debate procedures
13. Connect abstract and concrete ideas
14. Conceptualise a situation on the basis of what is discovered in the discourse
15. Revisit topics in a new context
16. Identify an "engineering discourse" situation

Figure 6.2: Actions associated with progress

Some of the examples stress the actions of other students, because they are particularly illuminating. I would claim to have undertaken each of the actions in Figure 6.2 myself as well. I should also point out that the list is not exhaustive, but it is representative of this particular insider's perceptions of progress in relation to discourse practices within this particular context.

6.2.1 Follow set procedures

As a discipline that is based on the practical application of mathematics, mechanical engineering does require its adherents to be able to use algorithms – rules and procedures to solve a particular type of problem. Right from day 1, we were given formulae and expected to use transposition and substitution and any algorithmic rules associated with the formulae. Though a little rusty at first, and inclined to get into difficulties with the units involved, I soon remembered how to do this and enjoyed the manipulations.

16 September 1997

Class finished early, but I was happy enough to go with two worksheets. The main thing we have to be able to do is work out what's being talked about and manipulate the figures. This is quite enjoyable and I'll try to do it tomorrow morning before work and probably review it before the class next week.

Journal Extract 18: Manipulating formulae

The anxieties about “being able to cope with the workload”, which many students express at the beginning of a course, subsided when I realised that I would be able to follow the set procedures. The journal contains some additional evidence, however, of students wondering whether they were “learning” anything. While being able to

follow the procedure was necessary, we were already aware that it would not be sufficient.

A procedure can seem dehumanised, despite its origins in human problem-solving. It eventually becomes routine, an operation in support of a more sophisticated action or even activity. Once a student has learned how to add, subtract, multiply and divide they become arithmetic operations – indeed, that is one way of referring to them.

The next action is related to this one, but it emphasises the human aspect and the role of mediation.

6.2.2 Imitate lecturer, text, fellow students

Following algorithms was satisfying, but sometimes the process seemed to be very “instrumental”. I did, however, acknowledge the need for such instrumentalism. In the extract below, there is use of the word “model” for algorithm; the use of this (possibly inappropriate) word probably arose because in my professional life, I noticed that a number of direct entry students were asking me for “models” of how to do things at university.

28 October 1997

Speed of delivery of information is a problem but he [lecturer] has no choice.... This is also evident in students' instrumentalism with tacit support of staff because this is the system... These students do however take their studies very seriously & appear to work hard.

I'm instrumental myself & certainly showed signs of this in trying to find "models" from the open book in the assessment to help me have a stab at the questions.

Engineering encourages this to some extent – asking people to use formulae & equations for practical purposes without actually questioning them.

Journal Extract 19: The need to follow algorithms

What was happening here was that the lecturer was having to provide us with "model" ways of working, apparently because there was so much to get through. This meant that at this stage we were simply imitating his workings and there was some discomfort associated with this.

It is difficult to see how learning/discourse acquisition could progress without some imitation. From psychological studies, a distinction has been drawn between imitation that is simply automatic copying and a more meaningful approach where imitation results in an understanding of the structure of the discourse. Vygotsky refers to this distinction and draws on the latter definition of imitation for considering the role of instruction in the ZPD:

development based on collaboration and imitation is the source of all the specifically human characteristics of consciousness that develop in the child... Understood in a broad sense, imitation is the source of instruction's influence on development.

(Vygotsky, 1934/1987:210-211)

The discomfort arises when there is a feeling that the imitation is just automatic copying (an action) as opposed to an appropriated process (Leont'ev, 1981b). If there is no understanding of the underlying structure, then errors will result.

6.2.3 Recognise errors

The problem with following algorithms unthinkingly is that certain types of expression can look similar when in fact they are not. The extract below illustrates how this can get in the way: it is suggested, however, that having to remediate such “faulty reasoning” gives the student additional insight into how to solve a problem. In the assessment that followed this action, I got everything correct.

30 October 1997

Examples of faulty reasoning

When I saw $8.2 \tan(x-\theta)$ I tried to multiply out the bracket. Later I realised you can't do this, but this is something I should know (tan isn't a multiplier).

When I got the answer for \tan^{-1} of $(\theta-30)$ I then tried to turn that into θ before looking at the quadrants.

Before the test I got the method sorted but I don't know whether it was simply that I had a model from which to work or that I had seen the mistake. I think it's a combination – I certainly see the error in the reasoning, but the model gave me comfort.

Journal Extract 20: Examples of faulty reasoning

This recognition of errors can definitely be associated with progress, but is not necessarily one that can be made public. If I had been intending to continue with a mathematics-based subject, I would probably be inclined to “hide” such evidence; once I realised what I was doing, I was rather embarrassed about it. There is a

“voice” in this extract that is recognisable from my own history at school – the teacher saying “you should know this”.

Sometimes progress might expose anomalies in previous “achievements”. One of my fellow students on the course told me that he had spent the weekend working out how to divide. This was after he had “passed” a number of mathematics-based learning outcomes, so clearly he “should have known” how to do division; it should have been an operation. He possibly passed his other outcomes through using imitation in the sense of “automatic copying”, or – and perhaps more likely – he did not have to divide himself as he was able to use the mediating artefact of a calculator to do it for him (Säljö, 1997a) (though Säljö does point out that such usage does require an understanding of the principles and implications in context of what is going on).

Students seeking advice from me in my professional capacity sometimes confess that they cannot approach the relevant lecturers to help them with gaps in their knowledge; as one put it: “because then he would know that I hadn't done the work myself in the last assignment”. Thus the notion “what I should know” sometimes gets in the way of remediating “what I don't know” or celebrating “what I now know”.

The example in Journal Extract 20 has not surprised anyone to whom I have shown it. There is often sufficient evidence in the products of students' work to allow an inference of such thinking. However, the insider perspective allows the evidence to be presented for discussion and analysis and does not need to be based on

speculation about personal characteristics. The main points it raises in terms of the present discussion are that progress can be associated with removal of barriers, and that this is sometimes necessarily a tacit process because of fears of loss of face or lack of acceptability in the community.

6.2.4 Compare practices

I accused myself of being instrumental and it was reassuring to discover I was not alone. By this stage, about two months into the course, we were starting to compare practices by talking to each other (not simply just watching each other). This extract comes just before I started to be aware of other people's names.

11 November 1997

One thing we are learning is to be very instrumental. "What equation do we use for this?" is a constant question and two assessments tonight both consisted of getting a model and putting in the right numbers. (One was a model & one was the appropriate equation.)

I actually felt that working through these under assessment conditions helped me to follow what was going on. However, I am still in a fog in general. The person in front told me he is as well and just occasionally something breaks through the fog.

Journal Extract 21: "We're all in a fog!"

This comparison of personal progress with that of the rest of the class persists throughout the journal and can also be inferred in other students from their comments. This example illustrates a particular case; because we were being assessed at an early stage in the course, it set a context for what "we" were to do in this course. By comparing responses to this, we were beginning the process of generating the shared experience that a community of practice will draw on.

The extract illustrates the Vygotskian construct of the Zone of Proximal Development (ZPD) very well. The whole class seemed to be in the same zone – attempting to complete assessments with guidance, with something occasionally breaking through that makes meaning. If I had been the only person “in a fog”, I would have felt very uncomfortable – though of course students do not always trust each others' expressions of lack of understanding (see Chapter 4 – “but you get merits”).

The role of assessment in this extract is interesting. We were having to be assessed at a time when we were still coming to terms with following procedures, imitating, recognising and rectifying errors. Most of the students, if not all, were then being assessed on something that they had not yet appropriated, though they were demonstrating that they were capable of doing the activity. Vygotsky would have said that this was the appropriate thing to assess:

Research indicates that *the Zone of Proximal Development has more significance for the dynamics of intellectual development and for the success of instruction than does the actual level of development.*

(Vygotsky, 1934/1987:209, emphasis in original)

It is possible that this is not how some of the “stakeholders” in education might see it: it might be assumed that the *actions* of students who imitated the lecturers were actually *activities* that they had appropriated for themselves. Discourse around qualifications certainly suggests this: for example, a prospectus claims that achieving some qualifications “guarantees” that the student will be able to do a particular job. If the job consists of automatic operations or well-learned actions with no associated

motive, then it may be possible to say this with such conviction; if it involves any of the higher levels of thinking, then it is not. However, if the student can work in a ZPD and it is known that this will be further developed through the particular job or career, the notion of “guarantee” is not so extreme.

6.2.5 *Recognise a specific procedure*

Being instrumental clearly worried me considerably; there are many references to it in the journal. The one below initially reads as though I am a lost cause – a complete surface learner in some people's terms – but there is evidence that I am starting to see the need to recognise procedures in a way that goes beyond “putting the numbers in”.

It is perhaps more true to say at this stage that I was able to **recognise that there is a procedure** rather than I recognised the procedure itself. This highlights an important attribute of activity theory: that it is object oriented. I had no problem in recognising that there were procedures: in this case I had to recognise the specific procedure necessary to perform calculations related to the operation of a manometer.

18 November 1997

I have become so instrumental that I can't even say what the letters mean – I just substitute where I can. Part of me felt I'd abandoned the learning because I knew he'd [lecturer] help a lot; however, I've changed my mind. He does a bit but some of his approaches are to try to get us to work through things ourselves, e.g. we have been scaffolded through an example for next week – but if we don't apply ourselves we won't be able to sit the assessment I'm sure. It's not just a matter of substitution (usually).

Journal Extract 22: “There's more to this than just putting in the numbers”

On later reflection, I would suggest that it would have helped me further if I had worded my problem as the need to “recognise the procedure necessary to perform calculations related to the operation of a manometer”. The absence of detail in the journal reflection about what the problem was underlines my own lack of focus at the time. Yet the extract is important because it indicates the initial stages of recognising such a procedure.

This extract highlights the fact that the lecturer in this difficult subject (who was also following a new syllabus) did actually want to move students on in their understanding and was not content to just allow automatic copying. There was occasionally some doubt about this; he did exhort us at a very early stage to “just put in the numbers” and he did supply us with model answers to imitate. Yet I could see that this was not going to be enough (and so could my fellow students). However, I had an action I could attribute to the lecturer – scaffold the students through an example – with all the connotations about scaffolding and the ZPD that were possibly not available to the other students.

At this stage of the programme, therefore, there seems to be a tension between the views of imitation as automatic copying and imitation as apprehending the structure of the discourse. Our progress, generally but not always, depended on our actions being motivated by the second view. (It has already been pointed out in Chapter 5 that when a learning outcome began with the word “state”, we were simply required to copy something out.)

6.2.6 Identify principles of a subject

Though I recognised that I needed to identify the procedures (and not just try to substitute numbers) it did take a bit longer to put this into operation. The extract below shows that a week later I had not really benefited from my insight about procedures. I had gone off at a tangent – but this still had a good outcome.

25 November 1997

Have had to give in tonight. Forgot to prepare for class – instead went over everything & then wasn't ready for assessment. Then couldn't take in next part. Brought both assessments home. Mike very understanding.

Strangely had felt more comfortable about thermofluids. Decided that conservation of energy is the key to all we have been doing. Suggested this to Mike & he agreed.

Journal Extract 23: The key principle of a subject

Instead of concentrating on the actions and operations required to get through the assessment, I tried to come to terms with the vocabulary and concepts associated with thermofluids. This had a good outcome – I “saw” a key principle, though in terms of the institutional learning outcomes it was not good at all.

Interestingly, this experience coincided with one I observed from the “other side” of the pedagogic relation. Earlier in the day, I had a group of engineering students who had not prepared for a class assignment I had set them. (I wanted them to write a short report under test conditions so that I could be assured that they were not copying.) I remembered thinking as I watched them agonise over what to write that I had set them up for this the previous week and they really “should know” what to do as they had had ample opportunity to prepare. It was salutary, then, to experience

the same lack of preparation from the student's perspective when I went to my class in the evening.

Recognising the importance of conservation of energy (for myself, as opposed to just parroting this expression) was an important step in apprehending the structure of the discourse (Laurillard, 2002). I might even have been said to have been taking a “deep” approach. Unfortunately, this did not meet the task requirements I had at the time and so although it was an action associated with progress, it was not the “right” action. It certainly would have underpinned the right action and the problem may simply have been one of time; I used all the time I had available to get to grips with the concept but did not take it the step further to allow me to prepare for the test. Those who prepared for the test with an inadequate grasp of the concept would still have performed better than I did.

6.2.7 *Fill in gaps*

As part of my approach to resolving some of the problems I was facing, I made a point of trying to identify gaps – to find out and remediate what I did not know. There are several references to this approach, which did seem to be useful, as might be expected. Often, the need to fill a gap is immediate; Terry, the student who kept asking all the questions, clearly saw it this way most of the time, at least at the start of the course when it seemed that he would not accept any gaps in his understanding. The example below comes from the time when we had started to cohere as a community of practice; peer support in filling in gaps was extremely important. This occurred in the CAD class, where there was frequently no teacher available.

12 December 1997

Andrew and I both felt we were making progress but we seemed a long way behind everyone else. Some people's progress was very dependent on where they were sitting – there was much peer support. Andrew likes this but is concerned about the blind leading the blind – though he has helped me a lot, e.g. there was an assumption in the title of a component about one of its dimensions – this was something I couldn't work out. I also needed “scaffolding” (again peer support) about chamfer – that it defaulted to a different angle from the one I wanted. This had been mentioned briefly by the lecturer but I had “lost” the information until Andrew showed me how to put the dimension in.

Journal Extract 24: Peer support to fill gaps

The example about the title of a component illustrates the advantage of informal discourse within the community of practice. Andrew, sitting next to me, heard me mutter about the bolt I was attempting to draw using the CAD package:

Christine What are the dimensions of this?

Andrew Well, it's called an M20.

I had interpreted this label as a parts number and it never occurred to me that the “20” could represent a size. I would have been stuck with this for some time if it had not been for the collaborative talk (Mercer, 2000) that was starting to emerge.

Computer-based work is frequently associated with such gaps and on the same day I in turn was able to help John who said: “If you're computer illiterate and they say 'press return' you say 'eh?'” He looked in vain for the button with “return” written on it; the symbol for carriage return was so much assimilated into the understanding of the person who wrote the instruction that it must have seemed “obvious”. Peer

support from someone to whom it was obvious was essential before John could move on.

Andrew's concern about "the blind leading the blind" is of course well-founded. He and some other students were drawing arcs by eye, which was not acceptable for the task we had been asked to complete. I was unable to do this, which actually resulted in my doing it the "correct" way for our current task, through measurement and plotting. For this reason, it is important for the community of practice to have some experts around, so that when students help one another fill in gaps through collaborative discourse, they do not consolidate and reinforce each others' wrong views.

6.2.8 *Discern variation in ideas and artefacts*

One of the problems with some of the ideas we encountered was that they did not seem to have a bearing on a concrete situation. This was not true in the same way for all of us. Andrew had been able to advise me about the dimension of a component in a CAD example because he had direct experience in real life of such components – to me, it was still an abstract idea. But even if the component was one that was familiar, its meanings were changing because we were now having to regard it as an object to be drawn using a CAD package. John had been annoyed with himself because he could not draw a component such as a bolt that he used daily; I had actually brought a bolt in to the class with me so I could be more familiar with what I was attempting to draw. All of us, with our different experiences of bolts, now had to see them in a different light.

While there is evidence of “seeing things in a different light” throughout the journal, the extract below provides an account of what it is like to recognise such discernment before it has been properly assimilated in speech. (For that reason, it is quite difficult to follow.)

13 January 1998

Conservation of momentum in inelastic collision seemed “obvious” – until it came to working with the formula at which point I wanted to keep referring to it as a model instead of thinking it through. It seems that these are two very different processes, requiring different mental states and presumably different parts of the brain??

Thinking through is more satisfying (generally) though there is some satisfaction to be gained from successfully following a model or substitution. What puzzles me is why I felt it necessary to move to the second state when I was happy with the first – and in fact felt I had to keep checking the second one more often. Is it because of being accustomed to this at school and in other situations – follow this example and you'll be OK – and that most things need to be done in this way as it can be wasteful to go back to first principles and follow the logic.

Journal Extract 25: Variation in ways of interpreting conservation of momentum

Briefly, what was going on here was two ways of seeing the situation – one might be described as operational, where I “saw” the different operations involved in conservation of momentum. The other might be described as computational, where I followed the algorithms that explained the relationships between the parts of the phenomenon.

As with all the examples, the motive to record it in the journal was associated with its being seen as significant. I was clearly struggling with new ideas and having to look at something in two different ways, which seemed to “jump”, which is why I wanted to find a physical location in the brain for them. However, the fact that I had recognised two different ways of seeing and was reflecting on what was going on

seems to be a starting point for more mature thinking and is thus put forward as evidence of progress.

Later, through relating it to readings on sociocultural theory, I was able to make connections between this extract and the distinction between scientific and everyday concepts. The situation described above was further complicated by my own existing uses of the notion of momentum – both with respect to observations about car crashes and seat belts and with the metaphorical use of the word, for example as in: “the couple's relationship seems to be gathering momentum”. Another point to note is my recent recognition of the significance of conservation of energy (as described in Journal Extract 22). I now had to see the notion of “conservation of momentum” in a different light – as an embodiment of an idea expressed in Newton's second law of motion. In particular, I was able to recognise later that my seeing it as “wasteful” to go back to first principles is connected with being able to recognise the associated algorithms as mediating tools that have been provided by the culture.

This analysis of Journal Extract 25 on conservation of momentum is in keeping with the “second face of variation” (Marton, 1999) (Pang, 2003) that became the theme of the “new phenomenography” towards the end of the 1990s (see Chapter 2) though in this case the description is presented by the learner herself rather than by another researcher. In fact, the example presents both faces of variation: (1) I experienced two ways of looking at “conservation of momentum” depending on whether my focus was on operational issues or computational ones; (2) each way was itself characterised by the way I discerned the critical features of the phenomenon.

Again, this example comes from the *beginning* of the stage of making progress; it is not representative of a fully appropriated concept.

6.2.9 Give and receive peer support in a community

There is increasing reference to the cohort of students in the journal (more so in the HNC than in the university module). The following extract highlights the closeness that was developing – recording our pleasure in seeing each other after the long summer break. It also brings out some issues about how our developing relationship was helping us with the engineering discourse practices.

9 September 1998

First night back – project night

Evidence of group support – pleased to see each other. John said: “You should be sitting over here” – so that I’d make a grouping with himself, Andrew and George. He talked to me about projects and suggested sailing. He sketched out a design of an aluminium hull with welding points and explained about compression. Said he’d like to do this himself but doesn’t have (a) garage (b) money. But he has done something similar with a pontoon. Simon and Ross were trying to work out the minimum they could do for their project. Sandy asked me about degrees [at the university where I worked] and whether he could fit it in with his job. I promised to find out. Peter told me his partner’s doing a course at the same time and nodded quietly when I said: “So everything’s going well then.” He’s thinking of changing his job. Spoke to or nodded to most people.

Journal Extract 26: Re-establishing the community of practice after a break

I also recorded in writing a brief conversation with John, after I admitted I did not really understanding how sailing worked:

John Oh I'm sorry; I thought you understood it.

Christine No, I find it hard to have a concept of what's going on – it doesn't come easy.

John Well did this come easy sitting doing engineering with a load of guys?

Christine The guys are great – the engineering's difficult.

This extract illustrates the complexity of collaborative talk in a classroom, some of which might seem inconsequential at the time but does actually contribute to progress. The extract is written very much in terms of target activity and action – reinforcing some earlier entries (such as observation on how others are planning on approaching the tasks that we had to do) and providing some new issues, such as the starting point for my own project. I did use sailing as a result of this discussion, though not the specific idea that John had proposed. It highlights John's knowledge of ideas that were too abstract for my current understanding. It might be surprising to know that John was the student in Section 6.2.3 who had difficulties with division when presented with decontextualised calculations. I was also conscious for the first time of how useful it was to be able to make lightning sketches of an artefact (such as a ship's hull or a pontoon) to illustrate the relationships involved within it or between it and its environment.

Extract 26 seems to echo and illustrate the views of Brown and Duguid, who write about the ways that people use social practices to augment the “rule-following” which inevitably breaks down at some stage in a process:

Chat continuously but almost imperceptibly adjusts a group's collective knowledge and individual members' awareness of each other. Providing information directly is a little like the chiming of an alarm clock. This constant chatter is more like the passage of the sun across the sky, a

change hard to see directly yet one that continuously reorients people to the progress of the day.

(Brown and Duguid, 2000:103)

Even the fact that I had not been able to follow all John's explanation about ships' hulls and pressure would have had an effect on his own understanding as well as mine. There is evidence of this elsewhere in the journal, for example: *Andrew reflected on my difficulties on his way home on Thursday – made him realise people see things in different ways* (Journal Extract 9 December 1997). This reciprocal reflection on the difficulties in the actions subordinated to an activity is more likely to be in evidence from an insider perspective, demonstrating “common knowledge” (Edwards and Mercer, 1987) in the process of construction.

6.2.10 Discuss abstract ideas

The opportunity to discuss developing ideas with other people in the community of practice is emerging, unsurprisingly, as critical to supporting appropriate new actions. This included staff as well as students, and some of the staff at the college were very good at “sharing” experience, knowledge and techniques with the students as demonstrated in the following extract.

11 November 1998

Went to college briefly to show Ben [lecturer in charge of project] questions that I thought were significant, and [a list of] existing knowledge. He made some useful observations about pressure created by differential in wind velocity – that I thought he'd made before but this time it fell on more fertile ground! I have to admit to being pleased that he had the same struggle as I had in trying to think where to draw a particular angle – I thought I was missing something obvious. He did say he ought to know how to do it but was rather brain dead this evening. The same thing happens to me when e.g. I'm searching for technical terms or concepts in my own discipline.

Talked to him about my experiences with words [beam and shaft – which were now taking on more specific meanings] and how I'd happily worked with them before. And also about my seeing loaded book shelves differently. He said how he felt sorry for access students as they only get little bits of info that don't really relate to anything. Also too much analysis and not enough of “just seeing things a bit differently”. HND students start to get a feel for what it's all about.

Journal Extract 27: Discussing ideas with an empathetic lecturer

There has to be an element of trust with the interlocutor when talking about abstract ideas in this way (and possibly an element of bluff with the speaker). This was a one-to-one talk that Ben was clearly keen to have with students about their projects, though many of them did not take up the opportunity. I opened up the discussion in a way that most students would not – they would probably be embarrassed to admit that they had only just realised the significance of the distinction between “beam” and “shaft”, which was related to the motion of the latter. I saw a number of lecturers in the college as being willing and able to discuss such issues *without putting the student down for her lack of knowledge*.

The fear of being told “you ought to know this” was absent in this situation.

However, one conversation with this same lecturer did alert me to why this fear arises. I noted down that he said: “*I take it for granted that people know these formulae. They're just kicking about my head – work, torque etc. If you know the formulae, that's the key.*” (undated notes in project file). I certainly aspired to

having such formulae “kicking about my head”, but it seemed to be taking a long time to happen.

6.2.11 Discuss engineering as a novice engineer

Over time, there is increasing evidence in the journal of wanting to talk about *engineering*, not just about being an engineering student. I began to recognise this and reflected on it in the extract below.

14 November 1998 Saturday a.m.

Thoughts while washing up.

Though I've been fairly scathing about college as an appropriate community of practice, I am still recognisably participating on the periphery of engineering. Some of this is joking: “I'm an engineer now so I swear/fix the whatever...” However, some of it is my talking genuinely with engineers about what it's like on the periphery. I think this is an important point, especially when it ties in with observations about language and also about noticing loading on book-cases.

Journal Extract 28: Talking from the periphery

I spoke fairly frequently at lunchtimes with colleagues in engineering departments at my own institution who were interested in what I was doing. This is again an example of “chat”, though sometimes it could turn into more formal “pedagogy” type conversations. For example, one of them had an exam question with him one day and asked me which direction I thought a force would be in. His colleague said: “*You can see her struggling with something that would come naturally to us*” (Journal Entry 5 February 1998).

I was beginning to identify myself as a person on the periphery of engineering. It perhaps helped that I had this “label” from the literature on communities of practice

(Lave and Wenger, 1991). There were variations in how we identified ourselves as participants on the course. When I suggested to Simon who sat behind me that he was a student, he was horrified at the description and retorted: "Does that mean I have to sit in a pub for three hours with a half pint of soda water and lime?" This is not everyone's stereotype of a student, but Simon did not seem to be too impressed with them. There were a number of observations from the cohort about graduates too, many of them uncomplimentary, for example *they sometimes get looked down on because of their degree and sometimes don't know as much* (Journal Entry 17 March 1998). During this conversation I also learned that there is a lot of snobbery in engineering; a lot of people who are time-served look down on others.

From their various positions in engineering companies, my fellow students were able to give me insights into engineering practice that I might not otherwise have had. This advantage is also illustrated in the following two sections.

6.2.12 Question and debate procedures

One way that people learn from each other is in identifying what is effective and what is not effective in each others' practice. This can lead to arguments, as in the following extract, which themselves give scope for clarifying ideas.

11 February 1999

Lab night – all left quite late!

Much more absorbed in what we were doing. I was with Simon and Ross who couldn't agree on method and level of detail. Simon wants to get on with it; Ross wants to be as precise as possible. He was also writing things down in a different sequence from Simon – he'd write down the error before he wrote the reading and this upset Simon who wanted a clear, logical approach.

There were a lot of complaints about the equipment and the pointlessness of the exercise.

Journal Extract 29: “I wouldn't do it this way!”

As an example of a complaint about the equipment referred to in the extract above, Ross observed: *“I wouldn't bother calibrating this – I'd put it in the bin.”* I felt that I learned a lot from such observations: they immediately enriched the context in which I was able to consider the equipment. The fact that Ross had used similar equipment before made him question the action of calibrating it. The equipment was completely unfamiliar to me.

My observations on the different approaches of Simon and Ross also suggest a dialogue that augmented my understanding. By observing both ways of recording the results, I had a clearer idea of what was going on. Seeing the variation in approaches was useful. It was a fairly simple exercise, once the unfamiliarity of the equipment was overcome, but talking about it and listening to talk about it were definitely beneficial.

Despite the complaints, there is a suggestion in Journal Extract 29 that the students were comfortable. The first sentence refers to a habit developed by most of the students of leaving classes early. The fact that they were willing to stay and work through the lab, in spite of its obvious limitations, suggests an eagerness and alertness that I also clearly remember from the time. Practical actions that involved

artefacts were clearly more meaningful for this cohort of students, an observation that I hear frequently in my professional life from engineering students who do not want to write reports because “this is not why I came into engineering”.

6.2.13 *Connect abstract and concrete ideas*

The examples have already shown how my fellow students and I benefited from each others' experience. Their experience of engineering practices and mine of academic practices were frequently drawn on in our discourse. In this sense, we were different from the daytime students who would not have access to such resources. For me, it was particularly helpful to hear about use of artefacts in actual practice. The following extract exemplifies this and also how the shared interpersonal knowledge increases over time and contributes to the dialogue (Cutting, 2000:49).

8 April 1999

Notes on discussions about labs show students going into a “professional” mode – e.g. Darren: “I’ve seen the blocks used as a ready reckoner – a go/no go idea but for surface” – in this case referring back to recent work common to the class’ experience and relating it to his actual work experience.

Journal Extract 30: Additional information from lived experience

Because I did not work on an everyday basis with the same artefacts as were being discussed here – most of them were entirely new to me – I would not have had the experience that the other students had of the transformations of meanings embodied in these artefacts :

the everyday concept acquires a whole series of new relationships with other concepts as it comes to stand between the scientific concept and its object. Its relationship with the object is also transformed in this process.

(Vygotsky, 1934/1987:223, emphasis in original)

I could only experience this vicariously when it came to the measuring tools that mediated the students' understanding of their workplace activities. Nevertheless, it was a useful start and my own transformations of meanings in everyday concepts and embodied in artefacts were also happening, as has already been suggested with reference to loading on bookcases.

6.2.14 Conceptualise a situation on the basis of what is discovered in the discourse

The journal records the benefits of repeated exposure to abstract concepts, mediated through discourse practices and other actions and also through artefacts. There could be problems in expressing what lay in the “Zone of Proximal Development” while it was still in the process of evaporating from speech into thought (Vygotsky, 1934/1987:280). This happened to me with the concept of an aerofoil – a body with a particular shape which exploits what is known about aerodynamics. (The body also occurs naturally as well as by design, for example in the wing of a bird.)

13 April 1999

Morning – working on project

I have just been aware of a desire just to plagiarise, knowing this would be acceptable anyway and feeling that with my clumsy way of rewording I'm at risk of losing some of the power of the original wording. This stage seems to come just as the student is on the point of understanding what is going on. (I'm writing about aerofoils.) I can understand it but recognise that the current status of my knowledge is such that my reproduction of it will be inadequate. I can tell that there are various different stages at which plagiarism may occur and this is probably a very significant stumbling block for students. Unfortunately, the end result appears the same to lecturers.

Journal Extract 31: “I can see it but I can't say it”

I did not at this stage have the labels “thin” and “thick” descriptions to attribute to the different motives for plagiarism that could have the same visible results.

However, this extract illustrates the distinction very well. The thin description is “copy another's work”. I continued this entry by itemising the different circumstances that would result in the same effect:

The following can all result in the same effect:

- the student isn't interested and sees copying as the best way to solve the problem of having an assignment
- the student has run out of time
- the student has no confidence in personal ways of expressing things
- the student is on the point of understanding but feels that he/she does not have sufficient linguistic resources to demonstrate this.

In the light of the current main argument of this study, it would be helpful to consider the actions of such students and the activity to which they are subordinated, which is a richer way of defining “the context”. I can reflect on the second item in the above list. Later, in the university course, I did actually plagiarise without realising that I had done so. We were asked to identify a list of items, and there was such a list in the textbook. According to the lecturer, most people in the

class just gave this list without attribution and were penalised accordingly. I was horrified when I discovered I had done this as I have strong views against plagiarism, though they were changing because of observations such as the one in Extract 31. My action – incorporating intention – was not to “plagiarise a list” as it was not deliberate. (This is debatable; some lecturers and other authorities would probably claim the act is plagiarism whether it is deliberate or not.) If it is accepted that it was not plagiarism, then it would have to be: **Obtain the required information from material that is immediately available** (because of shortage of time as I had left myself with only two hours to do my “homework” and prepare for a class test).

I had many good reasons for my lack of time, but as a fellow lecturer said to me at the time: “I’m sympathetic, Christine, but it won’t wash you know!” By positioning myself as a student, I had to accept the responsibilities and the consequences of not engaging in the appropriate actions required for the activity.

In the example in Journal Extract 31, if I had plagiarised (though I did not), it might well have been deliberate rather than accidental. The main point I want to make is that there can be a temptation to plagiarise at the point in the ZPD where the student has almost “got” the concept. One action in the extract was, as stated: **conceptualise a situation on the basis of what is discovered in the discourse.** But I still had to present this in some form and so another action in the “chain” was **find a way of expressing the newly acquired concept** (without plagiarising). To do this, I had to draw on my existing repertoire of language and integrate the concept of “aerofoil”. I adapted a sketch from a textbook and wrote a description of the airflow

round an aerofoil shape in my own words, though of course the “ideas” were all embodied in the shape itself and the historical discoveries that had led to it.

Students who come to me for advice on technical writing will sometimes report similar difficulties with “embodied” concepts, making such observations as: “It's not plagiarism; it's just a fact and there's no other way to describe it”. Being told not to plagiarise in such circumstances can lead to unhelpful actions such as use of a thesaurus to change some of the words and thus render the writing meaningless. Unless they can *demonstrate* their integration of the concept into their own language, however, the lecturer has no way of telling whether they have actually completed the action “conceptualise the situation” or they have completed an alternative such as “copy out a definition”.

6.2.15 *Revisit topics in a new context*

Repeated exposure to ideas over time led occasionally to unanticipated outcomes, such as in the example below where a new context for the notion of “reversibility” led to my revisiting the topic.

11 May 1999

I also spent some time on the Carnot cycle and began to feel it was sinking in... I realise that much of this type of reflection occurs on something already grasped. Some of what I'm doing here records struggles especially with words but there is a sense that what we really want is some correlation between "thing to be learned" and a later state of "thing that has been learned" and we all want to find the best (right) way of doing it. It is not always (rarely in fact) such a simple correlation.

I felt quite good about the Carnot cycle this morning – but what I think I was really getting to grips with was the concept of reversibility which has been bothering me for some time. So ostensibly I've learned about the Carnot cycle but it's more meaningful in terms of something I'd struggled with. If I hadn't had that struggle, the learning would have been far more descriptive. Yet it's the reversibility that's important in terms of its efficiency being a function of temperature and not the engine itself. So the struggle with the concept may have contributed to an elucidation of a harder idea – though it is difficult to decide whether or not one understanding is a cause or effect of another.

Journal Extract 32: Learning outcomes and exposure over time

The extract demonstrates how actions work in a chain. One action is a response to another. Thus the exploration of a new concept – the Carnot cycle – awakens the struggle with one already encountered, and provides a new exposure to it. A new goal then appears in an associated action: revisit the concept of reversibility.

What is interesting about this extract is that it contains some detail about the issues that is lacking from many of the others, notably: "efficiency being a function of temperature and not the engine itself". Despite the personal nature of the diary (I did not feel I would ever have to show it to anyone, though I knew I would want to quote from it), there is generally little detail of actual engineering concepts in the sense of how I want to use them. Indeed, I was aware that I did not want to write down anything that "might be wrong" (see Chapter 3). However, towards the end of the HNC, I was starting to feel that I might grow more comfortable about stating relationships between ideas and/or artefacts. Indeed, this journal entry shows a willingness to use the relevant discourse.

6.2.16 Identify an “engineering discourse” situation

The later entries in the journal relating to the HNC show signs of the emergence of a new way of looking at the world. The compilation of examples below would not take me very far in an engineering community of practice, but they are evidence of this changed perspective.

12 March 1999

Realised when trying to adjust temperature of water to rinse my hair that there was something interesting going on in the flow when the shift goes from the tap to the shower – that in principle I should be able to comment about the resulting volume and pressure of the water.

1 May 1999

Another thought – am now using entropy as a metaphor all the time – at first as a joke in a letter [to my cousin] (referring to housework) and then it seems to be a way of looking at the world and possibly at writing as well.

25 May 1999

Interesting discussion with Eddie [work colleague] at coffee machine re difficulties with thermodynamics. Eddie says there are 2 levels – conceptual one about what's going on here + the little calculations that have to be made to deal with something. Entropy is difficult for statistics students because of lack of knowledge of physics – randomness (I spoke of socks coming out of the washing machine). We talked a lot about real world examples to bring concepts to life – this could be very useful for my session on reflection.

Journal Extract 33: (compilation) Thinking like an engineer

All three of these examples show an attempt to move from the scientific to the concrete, particularly applying engineering principles to domestic situations (where they could be readily seen). The third example picks up on the point raised in Extract 25 (Section 6.2.8) where there are two levels for looking at an idea. Because I had myself experienced what I wanted to describe as “two processes in the brain”, I was very receptive to this problem.

The three examples together indicate how meanings are mediated through signs, words, artefacts, practices, and social interaction. By this stage of my engagement with mechanical engineering, I have come to adopt new meanings into my own discourse practices, particularly with a view to using them when engaged in discourse practices with the appropriate community of practice.

6.3 Conclusion

There is no doubt that the journal itself contributed to the ability to complete the actions identified in Section 6.2. Moon (1999) suggests that reflection might make it possible to “deepen” learning, being particularly associated with metacognition and cognitive restructuring.

My conclusion at the end of this chapter on actions associated with progress is that if I had thought of what I was doing in terms of actions and target activities at the time, I might have found the journal writing contributed even further to understanding. There is evidence in this chapter of such “reification” as being instrumental and using separate parts of the brain. It might have been more useful to think in terms of what activities and actions I was engaged in and what I should have been doing, and this might have included some occasions where “being instrumental” was the correct approach. However, a structured approach to the task of writing the journal such as “write about actions” might have inhibited the writing which could have been too great a cost for a study that depends on “what the student noticed”.

Moreover, the chapter has indicated that sometimes having a “reification” is helpful – it was useful to conceptualise the lecturer as scaffolding in a community of practice, and to use the construct of the ZPD, for example. Indeed, this is the point behind much of the sociocultural work on historical meanings that are embodied in artefacts and in situated practices; we reify them so that we really do not have to think about them too much. This is related to the reason that scientists turn verbs into nouns, as Lemke tells us (2002). It is easier to deal with processes as “things”. However, when we are learning how to use these reified ideas, it is perhaps necessary to describe what activities, actions and operations are appropriate.

The chapter has captured some of the actions and associated contexts *before* the stage where a concept is fully reified or developed. It is particularly useful to be able to do this from an insider perspective, though Vygotsky, his associates and his followers were also interested in this. Vygotsky was critical of psychologists for restricting their study to “fossilised behaviour”, as opposed to the way people actually develop their processes of understanding (Wertsch, 1981).

Some key issues resulting from this study have been:

1. the need to know about the internalised aspect of an action before one can make a judgement about the student's learning
2. the role of time and repeated exposure to discourses in appropriating new concepts
3. the frequency with which barriers and discomfort are associated with progress
4. the value of collaborative talk

5. the dialectical relationship between scientific and everyday concepts.

These issues are taken up in the next chapter which considers the implications of the study for tertiary level teaching.

7. Discussion: Discourse, Activities, Outcomes

The findings in Chapters 4 to 6 emphasise student activities associated with classroom discourse. The following discussion considers the relationships between these actions and the discourse practices, and raises questions about their expected and actual outcomes. It particularly highlights the potential problems of the lack of coherence between a student's internalised processes and the actions in which she appears to be engaged. This approach also raises the issue of the *target activities* for a student engaged in the activity of tertiary level education.

The chapter begins with a case study that demonstrates a natural tendency in students to try to pin down the causes of problems. There then follows a discussion on why the idea of "activities and outcomes" may be more serviceable than "causes and effects"; however, the word "outcome" is itself problematised in the course of this discussion. Through this analysis, topics raised in the review of literature in Chapter 2 are revisited from the "insider's" perspective: particularly the ideas of deep and surface learning, learning outcomes, engagement and alienation, and the metaphorical and actual places where the student is positioned. These are related to the insights from the findings, especially those on progress with the discourse (Chapter 6). The discussion also draws on an additional study (mentioned in Chapter 3) in which lecturers and students were asked about their understanding of the term "learning outcome".

7.1 Case study: the concept of interferometry

In many of the cases of difficulties with new concepts and procedures, most of these were eventually overcome, at least to the extent that I could work effectively with them and achieve the associated “learning outcomes”. There were some expressions, however, that were never understood to the extent that they could be reproduced other than by paraphrasing. One of these was “interferometry” – a method of measurement using a combination of similar rays of light. Journal Extract 33 shows the frustration associated with this. It is annotated with a range of “causes” identified at various times during one long day.

4 March 1999

[the resolution of a vocabulary problem, associated with “interference” from everyday language]

Still struggling to understand interferometry and in trying to get help from The Shorter Oxford have realised that the word “fringe” has a technical use I need to get to grips with.

one of a series of alternative light and dark bands produced by a diffraction-grating.

I had understood “fringe” to refer to the overall pattern, particularly the edge of it...

[questions to do with the procedure itself]

My problem seems to be that there are too many steps to this process – some related to the final condition required for the measurement and some relating to what you need to do to produce light that is in this condition....

10 minutes later. Still don't understand. Some questions:

What's actually being measured? How?

A – the slip gauge

By the reflection of the wave of light?

Using known frequency?

Now go back to the original and see whether the maths can be explained in these terms.

Why do the rays have to recombine?

[a problem to do with the teacher's instruction]

I was also thrown by the instruction to ignore the final pages of the maths as in fact those contain the explanation or part of it...

[concern with my self-esteem and relationship with other students]

There is also a calculation here about pay-off. I do have to pass this, but I could get away with plagiarism or clever paraphrasing. Other students (A especially) have offered to help. It has become a challenge for various reasons...

[a problem to do with the way information was presented – and this seemed a particularly significant observation at the time and later]

Still struggled with interferometry – spent 90 minutes on it this afternoon with the time just flying by. Sometimes the key information you need is hidden in a whole load of text – e.g. that it is the displacement that is being measured.

Journal Extract 34: Attributing causes of barriers

(The day's complete journal entry has already been reproduced in Figure 3.4 in Chapter 3 as an example of the different issues that can arise, especially in a deliberately unstructured journal.)

During the previous week or so there was also a reference in the journal to the unfamiliar context (a lab) and another one to aspects of the procedure itself. Looking back – “reflecting” on the problem – I later suggested that lack of practical application and insufficient use in context might also have contributed to the problem. This final attribution is the one most in keeping with Vygotsky's notion of how a scientific concept develops (already cited in Section 5.2.3):

The new word is not the culmination but the beginning of the
development of a concept

(Vygotsky, 1934/1987:241)

and it could also be said to subsume all of the others. However, this is not so much an attribution of “cause”, but more an observation about (absence of) context. More contextual associations such as additional uses and talk about interferometers could have overcome all the other barriers.

Thus the barrier to progress – that is, progress with an attempted action that could be worded **explain and use the concept of “interferometry”** – was attributed, by the student, to:

- complexity of the procedure itself
- unfamiliar environment
- interference from everyday vocabulary
- misleading instruction

- attitude – conflict between instrumentalism (and using other students' answers) and desire to “just see”
- lack of practical application
- insufficient use in context by the community of practice.

In the end, I ran out of time and had to paraphrase the answer without really understanding what I was writing.

From a phenomenographic perspective, an analysis of my answer to the question on interferometry in the “learning outcome” might conclude that I had taken a “surface approach” to the issue. Answers that are obviously paraphrased tend to be associated with the surface approach. Such an approach might reach the same conclusion even through an interview, depending on the way the questions were posed, my ability to articulate my intentions, actions and attempts at target activities, and my judgement of what the situation expected or required from me. The conclusion might also have been associated with the researcher's expectations, based on some assumptions about me. Yet the journal contains evidence of a student who was at least willing to engage with the signified as well as the signs and words, but who was perhaps not yet in the appropriate “Zone of Proximal Development”. I was lacking some of the discursive resources necessary to deal with this issue and my attempts to find them had failed.

Neither my own wish to find a cause, nor a judgement about being a surface learner, seems adequate for explaining and supporting the difficulties here. An alternative explanation is considered below.

7.2 Discourse and “seeing”

From early on in the findings from the journal, there was an emphasis on the wish to “see” (sometimes “just see”) what was going on. This is a metaphorical use of see – meaning to discern and understand all the aspects of a phenomenon simultaneously in order to use that knowledge. It frequently coincides with the idea of an action that has become an operation (Leont'ev, 1981a). The metaphorical use is particularly associated with abstractions, where the second order nature of the information means that it is not physically available in the world to “just see” in the everyday sense. The example being discussed here, however, depends on “seeing” as empirical observation.

Engineering students often report that they welcome the opportunity to work with physical objects as opposed to abstractions, and in my cohort a number of comments were made to this effect. Thus the levels of attention increased in a laboratory environment, or when equipment was brought into the classroom, as has already been observed. This happened surprisingly little in the HNC course and not at all in the university module. One of the HNC students had commented that he thought the course would be about half practical work; in fact, in the two-year period, there were only three sessions in the lab and two other classes where equipment was brought in. The IT and CAD classes were “hands on”, but only the latter was regarded by the students as practical engineering.

The teaching about interferometry was conducted in a lab with us all crowded round the interferometer. Here was our opportunity to see in the non-metaphorical sense – to observe with our own eyes what happened when certain measurements were being taken. The use of the interferometer was simply a demonstration of how it worked; all we apparently had to do for our assessment (or “learning outcome”) was describe what we “saw”. While the context was a technical one, it might be expected that we would all “see” the same thing in the same way – the way that the lecturer wanted us to see it as he talked us through his demonstration.

Säljö and Bergqvist (1997), in a paper on a very similar topic, point out the fallacy in this assumption. In their study on school students' work in a physics laboratory to “discover” properties of light, the authors highlight the essential role of discursive resources in being able to see such properties. It is not simply the case that students just register the sense data available to them from the application of the optics equipment and extract the “natural” meanings from this; the equipment itself is a site of embodied meanings and *was developed for that reason*. As Säljö and Bergqvist observe:

Learning in such contexts implies appropriation of accounts of the world that are neither out there in the objects themselves nor in our brains. Rather, they are cultivated in institutional settings for particular and sometimes highly specialized purposes.

(Säljö and Bergqvist, 1997:402)

In the example that Säljö and Bergqvist describe, there was arguably more engagement of the students in their learning than in my own setting. In their case, the lesson proceeded on well-established Piagetian principles: finding out, testing, induction – above all, actions associated with a target activity. In our own case, we were mainly observing, although students were allowed to “try out” the measurements for themselves in turn. I had no idea what I was supposed to be looking at. Nothing seemed to be happening. However, Säljö and Bergqvist report that the same problem occurred with the discovery learning; the students did not know what the equipment was for, and could not “see” anything happening. The authors' commentary on the motivation for the action – or attempted action – would apply equally to my own case with interferometry:

The rationale underlying the task, which the students are calling out for when claiming that they “don't know what it's for!”, becomes visible only when attention is guided by distinctions that originate from discursive practices produced within a certain scientific community.

(Säljö and Bergqvist, 1997:396)

The “discovery” method, popular in school education as a contrast to drill and practice or transmission approaches, frequently results in different outcomes to those intended, as a number of authors, notably Edwards and Mercer (1987), have illustrated. In the case of the students observed by Säljö and Bergqvist and also in my own case, the discovery was not possible as the necessary relationships between the properties of light were not available in our repertoires and our attention could

not then be guided by them. We had been introduced to an idea but could do nothing with it.

To those “in the know”, who have been fully socialised into the particular community of practice, the ability to see what the optical equipment is exemplifying seems natural. The properties of light are “obvious” and can be discerned from the situation. The knowledge has become tacit knowledge (Polanyi, 1966) and it is very difficult to put oneself in the position of someone who does not see the world in this way, who is not aware, as Marton (1999) would put it, of the “variations” that can be discerned from the situation. The people who know are motivated to see the variations and relationships because they have already been socialised into this way of seeing. For these people, *it is impossible not to see* the relationships.

Thus the students and the lecturer, though looking at the same apparatus, may not be in any real sense seeing the same thing. The thin description of the event is associated with more than one thick one. Even in the case of apparently physical “seeing”, what the students are supposed to see is not necessarily what they *do* see. The outcome of the target activity is tied up with its motive or object – and the “correct” motive or object may simply not be available to those who have not been socialised accordingly. In my own case, I attempted *post hoc* to socialise myself into the community of practice via the course notes, which were very densely written (and in fact had been extracted from a textbook). I believe that I made some progress when I realised it was the “displacement” that was significant, but I ran out of time to take this further and work out the processes or actions associated with this displacement. In densely written scientific texts, where a lot of processes have been

nominalised, the relevant actions can be obscured. It would have been much more profitable in this case to engage in collaborative talk about the processes (Mercer, 1995) and to have attempted some relevant actions, rather than attempt to extract the information from books. My attention – what I noticed – would then have been directed towards discerning the correct variations in the situation.

People who have mastered the meanings and activities embodied in artefacts tend to have worked with those artefacts over a period of time. I did not have another opportunity to see the apparatus after all my reflections on interferometry. I suspect that it might have helped if I could; seeing the issue in two dimensions (in the drawing in the notes) was not the same as seeing it in three.

7.3 Effects and outcomes

Although at the time, and through subsequent reflection, I attempted to attribute causes to my own difficulties with interferometry, this attribution did not prove to be very helpful. In the case study in interferometry, there are so many potential strong candidates for the cause of the problem that it would be difficult to know how to remedy the situation. The findings in Chapters 4 to 6 offer an explanation for this in terms of the numbers of actions that were associated with exposure, barriers and progress to discourse. The actions described there contribute to “the ceaseless flow of spontaneously responsive activity” (Shotter, 2000) between the participants in the community of practice. It seems meaningless to look for a mechanistic cause for an event in such a flow: the events are co-dependent.

Sociocultural theorists tend not to discuss causation – an observation that can be readily confirmed by its absence in the indexes of the literature. Nor do phenomenographers, except for occasionally pointing out that they are *not* attributing cause – they refer to associations and internal relations, but are careful not to say that one thing causes another. In neither case is their unit for analysis susceptible to easy causal attributions. As has already been shown, both sociocultural theory and phenomenography are non-dualist in nature – that is, researchers do not separate the individual and the environment for purposes of analysis, but regard them as inextricable in their interactions.

When the unit for analysis is a relationship between the experienced world and an internalised process, as it is in “word meaning” or “approach to learning” – or, as here, “what the student notices” – it is unlikely that a single event can be found that causes an effect in relation to this unit. This is also why the teacher's “telling” is not likely to be the single cause of the student's “knowing”. Rather, there are many events, activities and actions that occur over a period of time and can be linked to an eventual outcome. “Outcome” as a preferred description to “effect” can be found in both phenomenography and sociocultural theory, especially the former.

Phenomenography has developed out of attempts to account for “qualitative differences in outcomes” (Marton and Säljö, 1997:39) and has triggered much research around the **Structure of the Observed Learning Outcome** or SOLO (Biggs and Collis, 1982:22), referred to briefly in Chapter 2.

There is less emphasis on outcome in sociocultural theory, but the word does occur occasionally. As Engeström points out:

Any theory of learning must answer at least four central questions:

- (1) Who are the subjects of learning, how are they defined and located?;
- (2) Why do they learn, what makes them make the effort?;
- (3) What do they learn, what are the contents and outcomes of learning?;
- and (4) How do they learn, what are the key actions or processes of learning?

(Engeström, 2001:133, emphasis added)

The distinction between activity directed towards material objects and that directed towards ideal objects can be seen in the following observation on outcomes from Wells:

Much dialogue of significance to the participants yields no overt material artifact as outcome – unless a technological device is used to record the interaction; instead, the outcome to which the participants aim is an enriched understanding of the “object”, both individually and collectively.

(Wells, 2002:50)

Wells does not use the distinction between material outcomes and dialogic ones to separate them completely; he sees them as complementary and frequently simultaneous. It is important to recognise, though, that an outcome does not necessarily have to have a material form (although in terms of the usage of assessed “learning outcomes” it probably does, a position that will be explored here).

Engeström's focus on activity systems does something interesting to outcomes. In a review of the development of activity, he shows how the second generation of activity theory results in an outcome, but for the third generation, the outcome is replaced by further objects. (The first generation is concerned with mediation, the second with an activity system and the third with interactions between activity systems.) Engeström's representation of the first and second generations of activity theory were illustrated in Chapter 2 in Figures 2.3 and 2.5. Figure 2.5 is reproduced as Figure 7.1 below, for ease of comparison with Figure 7.2.

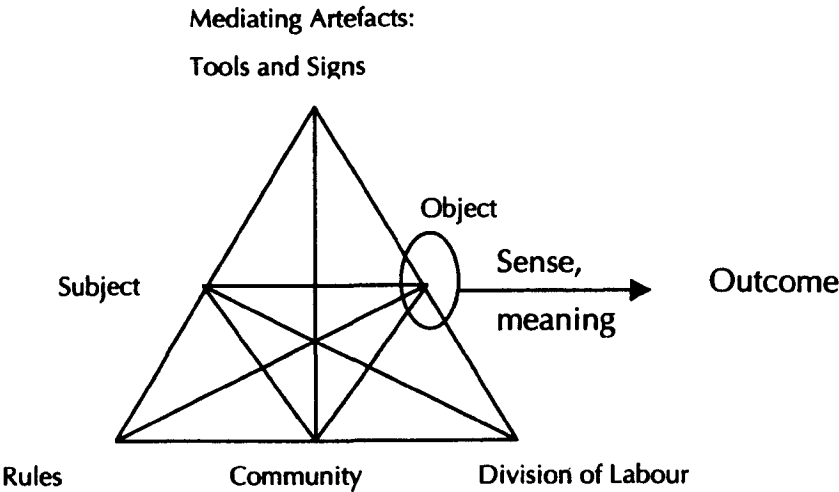


Figure 7.1: The structure of a human activity system (Engeström, 1987:)

Figure 7.2 shows what happens when two activity systems interact. Note what happens to the word “outcome”.

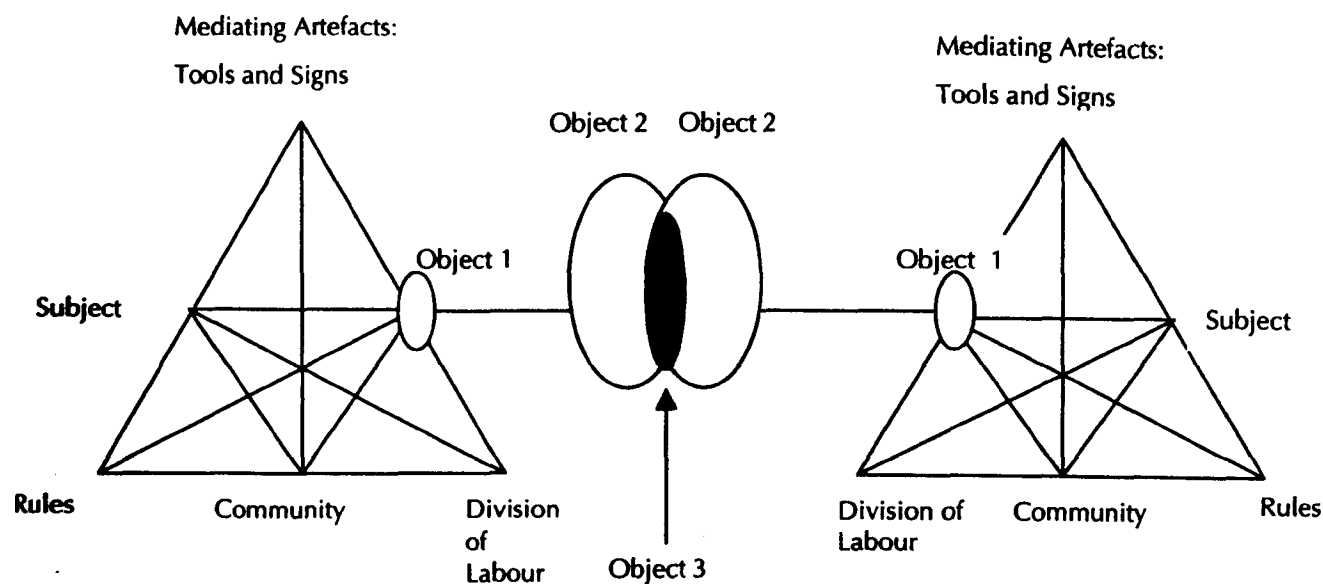


Figure 7.2: Two interacting activity systems (Engeström, 2001)

Engeström presents a view that “[a]ctivity systems are characterized by inner contradictions” (Engeström, 1996:72). Moreover, when two activity systems meet there are further tensions and contradictions. (This principle is considered further in Chapter 8.) The contradictions that emerge from two interacting activity systems result in changes not only to outcomes but also to the actual objects of the activity. In Engeström's focus on collective activity, though the notion of outcomes plays a part, such outcomes can be transformed into new objects or into instruments or actions and, as in the illustration above, may even disappear altogether.

Figure 7.3 is an attempt to illustrate this interaction with respect to the example of interferometry, already covered.

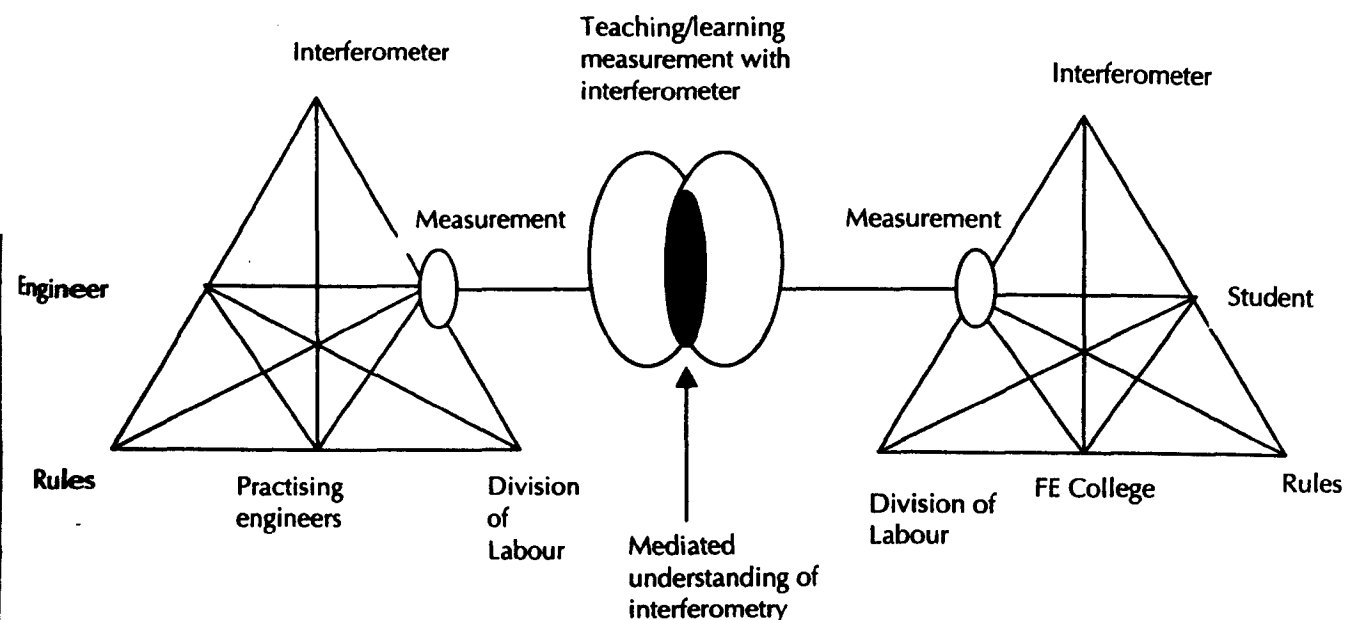


Figure 7.3: Interaction of the activities of engineering and college with respect to the use of an interferometer

While the example in Figure 7.3 is being used to make a point about the use of the word “outcomes”, it does also draw attention to the relationship between the activity of tertiary level teaching and the target activities that it is mediating. Though they can be described as belonging to two different activity systems, engineering and FE college practices do intersect and the notion of target activities is particularly useful. The target activities become objects in their own right.

It is perhaps not surprising that “outcome” – though employed as a description of an element of a sociocultural process or, specifically, an activity system – is not a strong feature of either. Vygotsky himself was keen to move away from “fossilised form” in

psychology in an attempt to “grasp the process in flight” (Vygotsky, 1978:64). Any “outcome” in this process is likely to be regarded as a source of development for the next part of the process and is thus transitory. Today's outcomes thus play a role in developing tomorrow's “objects” of activity.

From a sociocultural perspective, it is quite likely then that fixed and prescribed outcomes will be associated with problems, as Lave and Wenger point out:

The commoditization of learning engenders a fundamental contradiction between the use and exchange values of the outcome of learning, which manifests itself in conflicts between learning to know and learning to display knowledge for evaluation.

(Lave and Wenger, 1991:112, emphasis added)

This conflict, which provides an example of Engeström's “inner contradiction” principle already mentioned, is very much present in the case study in Journal Extract 34 above and is also a recognisable description of much of what was going on in the findings of Chapters 4 to 6. It presents a challenge to our normative practices with respect to formal educational institutions: that is, it suggests that we do not know whether the student really knows or is just putting on a display that will pass for knowledge. In other words, we do not have the appropriate “thick” description available to make this judgement.

At the time of writing, the word “outcome” is prevalent at all levels of formal education in the UK. “Learning outcomes” have been used in further education for

some time, where, as suggested in Chapter 4, the expression is used by lecturers, students and institutions to represent “elements of assessment”. Universities are adopting learning outcomes in their programme and module descriptors. Learning outcomes are not always, as in college, the exact equivalent to “elements of assessment”, though there is a strong move towards the encouragement of “aligning objectives, teaching and learning activities and assessment tasks” (Biggs, 1999:27).

A number of issues from the findings and analysis thus far in this study suggest that there may be some problems with the term “learning outcome”. There are debates in the literature about what they are and how useful they are; these are mirrored in discussions between practitioners; the insider approach has shown that outcomes are not always what they are said to be. These issues are considered in the following section.

7.4 What is a learning outcome?

7.4.1 Theoretical perspectives

While Marton and Säljö (1976a; 1976b) noticed a variation in learning outcomes, and variation has also been the theme of many subsequent studies, the aim of those who use statements of learning outcomes in teaching is to reduce such variation. By stating what the students should be doing, and aligning teaching and assessment to the statement, lecturers should ensure that the “right” outcome is achieved. This is based on actions and performance, reflected in careful choice of verbs used to prepare outcomes. As Biggs points out: “‘Understanding’ is a word of many values; we express one meaning, we assess another.” (Biggs, 1999:51). On the face of it, it

does seem fairer to be explicit about what we intend to assess. If by “understanding X” we mean “making a comprehensive analysis of X”, then the student who thought we simply meant “listing the features of X” will not have had the opportunity to perform the appropriate action.

The notion of activity is embodied in the learning outcomes approach, as is clear from Biggs' citation of Shuell below:

“If students are to learn desired outcomes in a reasonably effective manner, then the teacher's fundamental task is to get students to engage in learning activities that are likely to result in their achieving those outcomes.”

(Shuell, 1986; cited in Biggs, 1999:25, emphasis added by Biggs)

This may initially appear to be in keeping with the descriptions of activities and actions used in Chapters 4 to 6. However, as well as raising questions about how one “learns” an outcome, the quotation provides a useful illustration of the problem of ownership and boundaries of outcomes. Who desires the outcomes – the teacher, the student, or both? How does the motivation for the learning activities work and relate to the goals of the actions that make it up? What “counts” as achieving an outcome? In other words, to what extent is the student herself involved in the development of her own learning? The emphasis on engagement does suggest student involvement, but the relationship between actions and internalised processes is unclear. This is the basis for some of the concerns about outcomes; one such is considered below.

Barnett (1994) identifies two interpretations of competence (and, by his own association, outcomes) – a traditional academic one and an operational one – and accuses both of being essentially about closure. The former is closed with respect to the idea of objective knowledge being produced uniquely in disciplines within institutions; the latter (currently dominant) is closed with respect to performance which is predetermined. In both cases, students' actions are constrained. Academic outcomes are determined by the strictures of the discipline; operational ones by the skills that have been identified as necessary. Barnett finds both perspectives wanting, and his reason is because of the connection between thinking and action:

For academicism, action is subservient to and is reducible to thought; that is, formal, systematic, elaborated thought. For operationalism, thought is subservient to and is reducible to action. Legitimate thought is evident in action.

(Barnett, 1994:189)

Barnett's problem with such reductionism draws on the same view of action (and activity) used in the current study – that action (including speech) necessarily involves thinking and *vice versa*. By reducing one to the other, writers and practitioners deny this relationship and the resulting outcomes become an imposition: “marginalizing other forms of interaction and reasoning” (Barnett, 1994:82). Barnett calls for a completely different approach, leading to a way of being, of students becoming themselves – a view developed in a later book (Barnett, 1997) when he looks at the interrelationships between critical reasoning, critical self-reflection, and critical action. His concerns invoke the strictures of an “authoritative

discourse” (Bakhtin, 1981) associated with such an approach, a theme that emerges for those who have to engage with learning outcomes and is considered below.

7.4.2 Participant perspectives

Appendix 2 shows the results of a small-scale study in the university where I worked to find out what staff and students “mean” by learning outcome. Although it was small-scale and informal in approach (see Chapter 3) it did get a good response and yield some interesting answers that could be categorised in a way that bears some similarities to the method used by phenomenographers when they look for variations in understanding. (The method of producing the data – a simple single question – is not, however, one that would be likely to be used by phenomenographers.)

The main findings were that there was a split between the emphases on “learning outcome” as (a) a result or (b) an anticipatory statement, and that there were marked differences overall between staff and student reports of what they thought a learning outcome is. The student definitions are much more associated with end points, achievements, and, notably, assessment. (About half of these students were direct entry students.)

A closer look at some of the comments that staff provided in answer to this question raises further issues that may be relevant to the findings from the “insider” perspective in Chapters 4 to 6. If staff are to be the mediators of the institutional discourse as well as the pedagogical discourse, then the discrepancy of views on this will have an impact on that mediation. The survey I made on learning outcomes had a dual purpose; to gather information on staff views and to promote a debate

that might work towards “common knowledge” (Edwards and Mercer, 1987) in the institution about learning outcomes at a time when the word was becoming part of the institutional currency.

There were many comments from staff on the limitations of an approach based on learning outcomes, as well as a few on the benefits, and these are summarised in the study. However, the summarising process removes some of the finer points of the responses that are worth considering. For example, the need for “common knowledge” is itself recognised in the following:

There are as many different interpretations as there are people; the trick is to have enough common understanding to make the thing work.

But the same expression was used by another lecturer to express cynicism about trends in education:

If we come to a common understanding, the sector will immediately move to objectives and aims!

The directive to write learning outcomes had caused some problems for people, in terms of the way they wanted to work in the classroom; for example:

The requirement for completion creates problems.

This lecturer's concerns would seem to be exacerbated by the views from students that completion is a key aspect of the learning outcome. If the use of learning outcomes is perceived by lecturers as representing a shift from *accrediting attempts at activities* to *accrediting completed activities* then that is no small step. It involves decisions about what "counts" as complete and it is hard to accommodate, in the university's case, with a 40 per cent pass mark. Too much thinking along these lines could present the lecturer with an impasse. This concern about completion echoes the rejection of the "fossilised form" as an object of study by sociocultural theory (Vygotsky, 1978:64).

However, one lecturer acknowledged:

It won't make any difference to what staff do anyway.

If this is true, then it might make a difference in what staff "say" they are doing – or, more accurately, *how* they say what they are doing. To conform to institutional requirements, staff may have to write statements of learning outcomes. Alternatively, they will have them written by someone else on their behalf, as happens always in further education and frequently in higher education. The motive for stating intended learning outcomes will not be their own and this may affect the ensuing actions.

For some lecturers, the clash will not only be with their personal views, but also with the precepts of the lecturer's "academic tribe". This problem is *suggested* by the comment below (though the actual comment may simply have stemmed from a personal view):

The term fails to distinguish between an entity existing only in the private cognitive space of the learner and some form of objective display of competence, particularly one of a crudely operational nature.

Responses from staff came from all disciplines, but experts in social sciences and education, for example, would inevitably have been socialised into professional understandings of the processes and theories that might be associated with learning outcomes (or with the rejection of the notion). As has already been shown, writers in these disciplines are themselves in conflict.

There were a number of comments along the lines of the following:

I don't like the approach but we're stuck with it until the next big thing comes along.

This goes beyond the cynicism about educational trends and acknowledges the "authoritative" nature of the institutional discourse. The lecturer feels bound to undertake the actions associated with learning outcomes, not because of any persuasion that they are a good thing to do, but because it is necessary if one is to remain in the system.

This brief survey offers some suggestions as to how the people who are supposed to mediate the “authoritative” institutional discourse respond to it themselves. If the phenomenographers are correct when they say that variation in response is correlated with the concepts that people “hold”, then we should expect to see some differences in the actions of lecturers with respect to learning outcomes. It is not suggested that there would be a one-to-one correlation between conceptions and practices – that people who see an outcome as a result behave one way and those who see it as a statement of intent another. This would be a naive oversimplification. It is suggested, however, that the presence of different conceptions will present difficulties in the establishment of “learning outcomes” as part of the authoritative discourse of the institution. Yet it clearly has at least pretensions to such status.

There is a paradox here in terms of authoritative discourse: if its authority depends on the different ways that individuals interpret it, then is it really authoritative? Engeström (2001) would argue that the contradictions inherent in the different interpretations of “outcome”, and the target activities and actions that result from them, will result in developments in the activity system itself.

7.4.3 Some outcomes associated with actions in this study

Chapter 6, on progress with the discourse, focuses on actions associated with progress from the insider perspective. None of those in the list in Figure 6.2 corresponds to the learning outcomes achieved as part of the qualification. This is not to say that the outcomes were not achieved or were not important; but it does

emphasise the difference between outcomes that may be noticed by a student and outcomes that are desired by the system. Of course, I was specifically looking for evidence of progress with the discourse, which would not be the object of most students. However, I am arguing that progress with the discourse contributes significantly and is essential to “learning” a new discipline.

It is now possible to look at the outcomes achieved and make some observations on the actual actions that occurred in their achievement. I am using the example presented in the case study in this chapter: the concern with interferometry.

The official learning outcomes associated with the module on Metrology are as follow:

1. identify the factors which affect the accuracy of a measurement
2. evaluate the inspection requirements of a given component
3. define, explain and measure surface texture
4. calibrate metrological instruments in accordance with recognised procedures
5. use standard metrology equipment for the measurement of dimensional features

Figure 7.4: Learning outcomes for Metrology: Dimensional Source SQA website

The account of interferometry came under the first learning outcome. There were a number of performance criteria associated with this:

- (a) The definitions of the SI quantities, units and standards are precise.
- (b) The requirements of a standards room are correctly specified in relation to calibration system and environmental control.
- (c) The types of error commonly encountered are accurately described.
- (d) The description of the traceability of primary, secondary and tertiary length standards is correct.
- (e) The description of the essential features of calibrating length standards is correct in terms of procedures and equipment.

Figure 7.5: Performance criteria for identifying factors which affect the accuracy of a measurement Source: SQA website

It is the fifth criterion that covers the description of the interferometer. There are therefore a number of things that have to be achieved for the first learning outcome of which being able to describe how an interferometer works is just one small part, possibly not warranting the extensive treatment that I gave it as seen in Journal Extract 34 and Figure 3.4 in Chapter 3.

My notes from the time do not include the full SQA statement of outcomes and criteria, but contain an observation that interferometry would require a “*description of basic procedure (i.e. not last five pages!)*”, the comment in parentheses referring to the complex handout that described interferometry. The fairly thin description of the action “describe the basic procedure” might be covered by a number of potential actions with the basic procedure as object, including imitate, paraphrase, memorise and reproduce, summarise in own words, identify the key stages, plagiarise, copy.

In this particular instance, it was not an open book test so plagiarism and copying were not possible, but memorising and paraphrasing were available and were what I used. I did not have the necessary resources actually to identify the key stages of the basic procedure, though I did have sufficient to make it *appear* as though I could by paraphrasing.

Figure 7.6 identifies some of the actions associated with the basic procedure of interferometry. I have looked at all of the actions that seem to be happening on 4 March 1999 (though I may have missed some). This journal entry can be seen in full in Figure 3.4. The actions include some diversions: thinking about deep approaches, considering questions I might ask fellow students, considering an irrelevant and erroneous observation about traffic signs that I thought might be connected. As with Ryle's thick description of Rodin's thinker, I might be said to have been:

mooting and suspiciously examining not only questions, but also objections, warnings, reminders, etc.... experimentally to find out whether or not they would be or could be profitably followable pointers.

(Ryle, 1968:8, Internet version)

In my own "inner speech" there would be far more mooted and examining of issues than were actually recorded in the journal, but the journal does provide a fair amount of evidence of what a student "noticed" about the process of understanding interferometry at the time.

- check definitions of terms and select one that matches the situation
- identify the objects of the stages of a process
- reflect on the depth of the approach being taken and the nature of an engineering community [not relevant to target activity]
- ask questions about the object of the procedure and the method used
- find all the necessary stages of the procedure
- consider the implications of a missing stage in the explanation and how this might relate to educational research [not relevant to target activity]
- reflect on progress and summarise steps taken [not really relevant to target activity – was done for other reasons]
- reflect on motivation
- attempt to connect an unrelated experience [not relevant to target activity, but thought to be possibly]
- reflect on progress in other aspects of the course and on support [not relevant to target activity]
- identify key information for the problem – exactly what is being measured

Figure 7.6: Actions relating to the learning outcome “describe the basic procedure of interferometry”

These actions do not complete the description: that happened another day when I paraphrased (without fully understanding) the main ideas in the handout. To achieve this, I still had to be able to pick out what the main ideas were and the actions in Figure 7.6 will have helped this.

7.5 Outcomes and engagement

In the example above, I was clearly engaged in trying to achieve the appropriate outcome – in fact, I was trying to go beyond it and I was aware that this was the case. I did have to engage with the idea at one level, because this was an example of assessment where students had to reattempt and pass sections that were not correct on their first attempt. Under this interpretation of criterion-referenced assessment, a student can do very well in most aspects of the assessment but fail because a single criterion has not been met (a situation I had already encountered in relation to a different qualification).

If the test had been associated with, say, a 40 per cent pass mark I might have been able to get away with an inaccurate statement about interferometry and still have gained a high mark if everything else was correct. It would seem, therefore, that specifying that an outcome must be achieved might be said to increase the likelihood of student engagement.

However, this impression has to be tempered with the view, evident in the findings in Chapters 4 to 6, that sometimes there is the *appearance of an action* that is not the actual action and does not contribute to the target activity. Thus a product or performance that might be associated with the verb “describe” or “evaluate” was in reality more appropriately an example of “copy”, “plagiarise” or “imitate”. This highlights the difficulty of the distinction between desired or intended outcomes and actual outcomes which was raised by the survey of staff and students in the previous subsection.

7.6 Main issues from the discussion

A key question emerging from this analysis is: “What counts as an outcome?” By stating desired or intended outcomes explicitly, institutions might be said to be trying to reduce the number of doubts and mysteries on this issue. However, it has been demonstrated that the “thick” description of what a student is doing does not necessarily match with the motivation embodied in the outcome. This is frequently because she does not have the resources available in her discursive repertoire to do this, but has to perform an approximate action based on what she does have. What “counts” for the institution or the lecturer in warranting and assessing the student's performance has to be based on inference.

It is also important to ask what “counts” for the student. The insider perspective reveals some interesting attitudes from students about what is significant. The journal indicates that while I agonised over the meanings of enthalpy and interferometry and the operations of the artefacts in which such meanings were embedded, I was happy to use other such tools without question. An example of this has already been mentioned (5.2.3): the notion of second moment of area which I questioned in Year 2 only to discover that I had already been using it in Year 1. My experience suggests that the variations the student notices at the time will depend on her readiness to notice such variations. It will depend on whether her discursive repertoire permits her to notice such variations.

What counts for the student also relates to what is valued by the student, as shown in Journal Extract 17 in Chapter 5. There is a major gulf between Terry's actions when he began the course and wanted to ensure that there were no gaps in his knowledge

and those inferred from the offer of money to write his “essay” for him. If the target activities themselves are not valued, then it is possible that they will not be carried out as intended. It is quite possible for a qualification to be desired without the desire to be able to perform all of the target activities it warrants. This is especially the case when there are doubts about whether it warrants such activities at all.

Some of the issues for a student here go beyond the idea of progress with the course but challenge their whole way of being. While some may have no compunction about asking fellow students to do the work for them, others may feel uneasy about being “caught in a web of sincerity and deception” (Ivanic, 1998:168). They can feel fraudulent and may even describe themselves as “impostor” (see Journal Extract 16 in Chapter 5).

The student who is on the periphery of a discipline is also operating in a physical environment, responding to spoken and written discourse in that environment and to other semiotic mediation such as algorithms and artefacts. It is important to take into account the *absence* of discourses and other semiotic tools that might be appropriate for the discipline but are not present in the physical environment or available from the student's repertoire. And as well as the appropriate discourses there may well be competing discourses present in the same environment. The student – a novice in the environment – has to be able to select what is appropriate from the mass of competing discourses, while still possibly not being exposed to everything necessary. As has been shown, a dominant “warranting” discourse of the academic institution may take precedence over the disciplinary discourse. In such a case, if they are to achieve their qualification, the student's actions must be motivated towards the

activity of tertiary level education in preference to the target activities of the discipline – the authoritative discourse will be the inevitable guide to selection of what is appropriate.

This chapter has highlighted the potential problems that might be associated with what is actually being warranted and leads to a question about whether statements of outcomes, useful as they are in guiding and supporting both lecturers and students, may give the wrong messages about what higher education actually is about. It will be suggested, in the final chapter, that an emphasis on target activities and actions rather than outcomes could result in more meaningful interactions.

8. Conclusion: Messages from an Insider Perspective

This final chapter identifies the contribution of the insider perspective in terms of both theory and practice in higher education. Answers to the research questions established at the start of the study highlight the relationship between the activity of higher education and the internalised responses of an HE student to that activity. The associated tensions and contradictions are explored further to offer frameworks for considering improvements to practice, as well as directions for future research. Alternative approaches to the present study are also suggested during this analysis.

8.1 Contributions of an insider perspective

Four questions were posed at the start of this study. Each is reproduced below with a summarised answer based on the findings in Chapters 4 to 6 and the discussion in Chapter 7.

Question 1: How do students engage with discourse practices in an academic environment?

The findings from this study concur with sociocultural theory that sees engagement as a complex response depending on: the students' histories, the available discourse repertoires, the other participants in the discourse, and interactions with the specific cultural context. Another way of saying this is that the level of possible engagement is dependent on students' Zones of Proximal Development as described by Vygotsky (1934/1987). Chapter 6 traces my increasing levels of engagement with the language and other practices associated with academic mechanical engineering. As

was shown there, the internalisation of the language and practices moved from *following set procedures and imitation*, through *connecting abstract and concrete ideas*, to *beginning to think as an engineer*. The ZPD changed throughout this process and the Vygotskian notion of a dialectic relationship between scientific and everyday language is also present.

It has also been shown here that approaches taken by an individual student may be associated with predilections or tendencies, but these go beyond the “deep/surface/strategic” categorisation related to phenomenographic studies. In my own case, the predilections include tendencies to postpone engagement in actions subordinated to the activity until more discourse is available, and to augment exposure through my own efforts if possible, and they also include my attempts to disguise lack of understanding. Occasionally, and perhaps ironically in this context, there is also evidence of a predilection to attribute psychological labels to myself that *explain* tendencies, especially limitations – for example, “surface”, “subject to a “halo effect”, “field dependent” (and therefore unable to distinguish embedded drawings). It is ironic because my initial concern had been about “deficit models” for describing student experience; it seems that I had my own deficit models to ascribe to myself, as indeed do many other students.

The study does not therefore deny that people have predilections; but it does warn that they may not provide a full picture. Furthermore, using predilections as categories may obscure other important information and prevent it from emerging. It is suggested that this is what happens in some phenomenographic work.

The conclusion that the deep/surface/strategic categorisation is inadequate as an explanation for variations in students' engagement has emerged as a result of considering the *actions* of students in response to the discourses that they encounter. The complexity of student engagement is heightened by the sheer number of actions that a student undertakes with respect to the activity of tertiary level education and the target activities of mechanical engineering. Each journal extract in Chapters 4 to 7 is associated with a set of actions that are very specific to the circumstances. The ability to provide the "thick description" of the actions facilitates additional relevant information that assists interpretation and explanation.

There is a strong message from the study that, whatever the circumstances, engagement is likely to be enhanced by appropriate and frequent exposure to relevant discourse practices and opportunities to have a dialogue *about* them and *within* them. Alternatively, engagement is likely to be hindered when any parties in the system make – and act on – assumptions based on inadequate and incomplete information.

Question 2: Is a focus on academic discourse practices – rather than one on "learning" – useful for exploring what happens to students?

Claims that researchers and practitioners make about learning may be based on a tacit assumption that everything we describe as learning can be assumed to have common features (an assumption identified, and rejected, by Säljö, 1997a). We cannot look at a piece of learning; we can only infer it from actions and products. However, we can look at a record of discourse – or, as in this case, of responses to the discourses – and draw conclusions about that discourse and those responses.

The findings here have suggested that such an approach may offer opportunities to say something about learning, without having to focus directly on learning as an entity with clearly-defined features.

“Discourse” and “activity” are also complex concepts (like “learning”). They are complex because they involve both external and internalised aspects, inextricably entwined. The external aspects are empirically available for scrutiny and these are the same sources of evidence that we have for learning. The internalised aspects are thus likely to be relevant to readers interested in learning.

The study has considered academic discourse practices and other related actions, providing multi-layered accounts (thick descriptions) of what seems to be actually happening in circumstances we might describe as involving learning. These accounts suggest that what is happening is not always what is assumed by some of the participants or what is “meant” to be happening.

Question 3: What can the students' perspective on their experiences offer that is additional to current research?

The students' perspective can offer information on otherwise inaccessible internalised aspects of activity and response to discourse, and can thus expose some tensions and contradictions that might be hidden by the system.

For some of the dominant paradigms, such as those emerging from phenomenographic research, the insider perspective provides insights on how a student discerns variation in a classroom situation that goes beyond the need to

postulate some fixed attribute of the student. It also highlights what “counts” for the individual student, without having to filter it through a researcher’s view of what is significant.

The approach here is more in keeping with the increasingly dominant sociocultural perspectives on education, but it adds to them an analysis of internalisation from early on in the process. For activity theory specifically, it provides evidence of the *local* impact of tensions in an activity system such as higher education (there is more on this in Section 8.2 below). For work on academic literacy, it extends analyses to include responses to problem solving as well as writing; the study has also contributed information on the difficulties that engineering students have with writing, although much of this is second hand rather than “insider”. However, there is an insider perspective on plagiarism – explaining what it “feels” like to be tempted to plagiarise at the point of understanding a concept (Section 6.2.4) and this may be particularly relevant to the academic literacies community.

While phenomenography elicits the *researcher’s* categorisations of students’ experience, my study has attempted to provide data on students’ experience directly from the *students’* perspective. Much sociocultural theory and academic literacy work bridges the two, with attempts to work *jointly* with the people whose experience is being studied (for example, Ivanic, 1998; Lillis, 2001; Mercer, 2002). In one sense, the current study might be an extreme position of the sociocultural approach: the researcher actually *is* one of the students. This does mean she has access to impressions from an earlier stage – from the time when she is “standing at

the edge of the discipline” (Mann, 2001) when a researcher might normally feel it is too difficult or too intrusive to find out what is happening to the student.

As is suggested later in this chapter, although the insider position has the benefit of direct access to the processes of internalisation, this has to be balanced by lack of access to other features of the activity system because these are obscured by the level of personal involvement. More simply, I am unable to comment directly on how an *outsider* sees this particular student’s responses to discourse and thus observe objectively how it relates to others’ responses (although I am willing to engage in dialogue about this). It might be hypothesised, for instance, that a dialogue with an outsider could be more fruitful (than the insider perspective alone) for drawing out which discourse practices were missing from the environment.

Question 4: What do the findings offer for analyses of current issues in higher education?

The findings have suggested some concerns about current practices that emerge from dominant paradigms, including the labelling of students (or even their approaches) as deep, surface or strategic, and also assumptions about “learning outcomes”. The study proposes that an attempt to generalise about student experience may mask the complexity of that experience for each individual student and may therefore be unhelpful. If our descriptions of situations are too “thin”, then any associated remedies are likely to fail.

These concerns were particularly expressed in relation to the case study in Chapter 7. In that chapter, the issue of “what a student notices”, which is the unit for

analysis throughout the study, was brought to the foreground in the visual experiment on interferometry. The student can notice or “just see”, both literally and metaphorically, only what is within her ZPD. However obvious a situation is to a lecturer or researcher, the student can only “see” it if she has already been exposed to and has been able to internalise the relevant discourse practices that support it.

The above would suggest that “what a student notices” is not only a revealing unit for analysis but should also be considered for its implications for course design and student support in colleges and universities. It may be difficult to see how this could be done successfully; there is an enormous range of student experiences and associated ZPDs and discourse repertoires. However, it may be possible to alert students to the need to position themselves so that they do “notice” what is appropriate. Figure 8.1 suggests a framework for this, based on the findings here, that could be used by lecturers, personal tutors, student supporters and by students themselves.

Students need to know that...	They need to know how to...
Spoken and written language will be affected by HE experience – students are likely to have to change some practices	Get exposed to use of language that is appropriate to participants in Higher Education (through listening and reading – and also through speaking and writing)
Each subject discipline is associated with its own ways of speaking and writing; some of these ways may clash with a student's current practices	Look out for the language conventions that a subject discipline uses, in both speech and writing
Lecturers should guide students in the ways of speaking and writing in the discipline, though this teaching will frequently not be explicit	Use language to respond to different teaching approaches (lectures, seminars, writing essays etc)
Groups of students (and lecturers) can evolve into communities that share ways of speaking and writing; these are academic discourse communities and not yet the communities of the actual practice studied	Recognise how social language works in these communities, and use it assertively and appropriately
A university or college may constrain what, how and when communications "count"	Interpret regulations for participating in and completing higher education
Practices in speaking and writing in universities and colleges are constantly changing	Engage with new ways of communicating, including new technologies

Figure 8.1: What students need to know about language

Figure 8.1 highlights some of the issues, including tensions, in the system that may (and should) become apparent to individual students. Guiding students to "notice" these, through dialogue and careful construction of the curriculum, may help them

to negotiate the discourses of higher education. The figure may also suggest some avenues for lecturers and “study skills advisers” to explore through dialogue when a student is having difficulty.

This study has also exposed tensions and contradictions that affect the whole activity system of higher education itself, though it will perhaps be more useful to conceptualise higher education as a set of intersecting activity systems. A closer look at these tensions will draw out some further messages for higher education students, staff and institutions and this is the subject of the following two sections.

8.2 Tensions and contradictions discovered through the study

Although the insider perspective associates this study with the individual and “mediated action” perspectives of sociocultural theory, it has also drawn on the tools of activity theory and can in turn make a minor contribution to this theory by highlighting contradictions in practice. This is in keeping with “a radical localism” identified by Engeström:

The idea is that the fundamental societal relations and contradictions of the given socioeconomic formation – and thus the potential for qualitative change – are present in each and every local activity of that society.

(Engeström, 1999:36)

Figure 8.2 traces some areas of tension highlighted by the study. It should be stressed that tensions and contradictions within an activity system are inevitable and are sources of further development, so there is a positive aspect to this approach. However, these tensions can be associated with problems for the participants. Each of these “systems” will be briefly explored in Section 8.3 to identify any issues or problems associated with the tension as well as potential implications for the development of the system both through research and practice.

In doing this, I am not making the case that I am deriving observations about the system from an individual’s experience. In keeping with Engeström’s position in the quotation above, I am claiming simply that these tensions are present in the local activity and I have attempted to identify the impact on individuals. This is an important point; the tensions reveal areas for further research and it will become clear in the subsequent analysis that such research would be inadequately covered by an insider perspective alone.

Activity system	Contradiction/tension	Chapter/Section
Higher Education research	<ul style="list-style-type: none"> • student experience vs • researchers' interpretation of student experience 	2.1
(a) Phenomenography	<ul style="list-style-type: none"> • deep or surface quality in student vs • interaction with environment 	2.1
(b) Sociocultural theory	<ul style="list-style-type: none"> • individuals within culture vs • collaborative activity 	2.2
Access to tertiary level education	<ul style="list-style-type: none"> • physical access vs • access to discourses • preparation for HE within FE vs • acclimatisation through participation in HE 	1.2 and 4.4
Course design	<ul style="list-style-type: none"> • Learning outcomes as: (a) anticipation (b) result (c) assessment • achieving "learning outcomes" vs • claiming that something's been learned • behaving normatively vs • emancipatory learning 	7.4 and Appendix 2 2.2, 4.3 and 8.2
Assessment	<ul style="list-style-type: none"> • actual development vs • potential development (ZPD) • actual activities vs • apparent activities • "passed" outcomes vs • delayed understanding of past "outcomes" 	2.2 5.2 and 5.4 6.2.3 Appendix 3
Certification	<ul style="list-style-type: none"> • warranting of "our" graduates and faculty vs • warranting of activities that people appear to have done 	4.4

Figure 8.2: Potential contradictions and tensions (raised by this study) within activity systems in tertiary level education

8.3 Implications for further research and practice

Figure 8.2 suggests five broad areas where further inquiry into the tensions and contradictions might lead to change: research itself, access, course design, assessment, and certification. Each area is explored further below.

8.3.1 Higher education research

An issue was raised in Chapter 2 about who determines what a student's experience actually is. The insider perspective is a response to a concern that the students' views may be inadequately represented or categorised because of the frameworks used for doing this. The study here has confirmed that some descriptions and categorisations may fail to get to the heart of this issue; for example, a student may be deemed to be taking a surface approach when it might be more useful to ask a question about her exposure to discourse practices. This observation underlines the truism that there are several ways of describing or explaining the same phenomenon.

As in other disciplines, research into Higher Education issues will always be contested. This is partly because of the differing theoretical perspectives of its researchers. Two broad areas have been highlighted in this study: phenomenographic and sociocultural. As previously identified in Chapter 2, these have certain things in common: they are non-dualist (do not try to separate mind and body); they aim for ecological validity (look at actual experience in context rather than lab based artificial experiments); there has been some interaction between the two. They are therefore not presented as oppositional, but they contribute in different ways. While the phenomenographic approach has been useful for

highlighting variation, the sociocultural has been able to provide more tools for examining an insider experience and for overcoming some of the methodological concerns.

Figure 8.2 indicates that there are also tensions *within* both of these broad areas. These particularly relate to the objects of study and units for analysis deemed appropriate by the researchers. My observation above about non-dualism as a feature of phenomenography (see also Trigwell, 2001) is contradicted when some researchers describe “deep” or “surface” *students* (see Figure 2.1 in Chapter 2.), implying a mental state that is independent of context. This contradiction demonstrates that a research specialism itself is subject to change, and the changes may not suit all of the adherents to the specialism. As was suggested in Chapter 1, the changing context will itself contribute to the pressures for change on the theoretical perspective. The contradiction that has emerged therefore suggests that there is still a need to find a way of making appropriate interventions without using labels that mask what is going on.

While there is a tension in sociocultural theory as to whether individuals in context or the context itself should be the object of study, it is in keeping with the nature of sociocultural research that ways of exploring and resolving such tensions should be found. Engeström and Miettinen in their introduction to *Perspectives on Activity Theory* (Engeström, Miettinen and Punamäki, 1999) claim to welcome opportunities for collaboration with those who promote theories of mediated action (for example, Wertsch, 1991) and communities of practice (for example, Lave and Wenger, 1991), although they do find both of these perspectives wanting because they do not expose

the contradictions that arise in practice. The position put forward by Engeström and Miettinen appears to be a similar argument to my own about phenomenography: that there is a danger that the theoretical perspective itself limits the way that the data can be represented by using categories that exclude some of the information that might otherwise be available. While the review of literature in Chapter 2 did anticipate some of these concerns, the full impact of the relationship between “hidden” information, the methods of eliciting data, and the associated outcomes only becomes apparent after a closer study such as has been provided here. It seems that researchers may have not discovered the effects of lack of exposure to appropriate discourses *simply because they were not looking for them*, to parody the authors of the original study on approaches to learning (Marton and Säljö, 1997:43).

Concerns about objects of study and appropriate units for analysis were behind much of Vygotsky’s writing as well as his followers, and have been highlighted as an issue in the current study (see especially Chapters 2 and 3). Vygotsky’s position, and the implications for the current analysis, are summarised in Zinchenko’s observation:

The unit must maintain the characteristics of the unified whole, though internal contradictions and oppositions may exist.

(Zinchenko, 1985:96)

The situation is made more complex by the fact that this “unified whole” is not a static object of study – it is itself subject to development. Thus Vygotsky and his followers are also concerned about the historical implications of the situation: they

are considering genealogical as well as individual development (phylogenesis as well as ontogenesis) (Vygotsky, 1981a).

The pervasive metaphor of place identified in Section 2.2 may need to incorporate geology as well as geography; our practices and especially our artefacts embody many strata of culturally-defined knowledge accreted through the discourses of the associated communities of practice. Thus the changing culture identified at the start of this study will itself contain internal contradictions and oppositions that will affect the individuals involved and also lead to cultural developments. If we want to understand this, we must investigate all of these aspects together.

What is needed, then, is research into higher education that is based on theory that:

- (a) does not itself impose inappropriate constraints or limits on the data that can be gathered
- (b) takes account of the ever-changing context.

8.3.2 Access to tertiary level education

A strong case was made in Chapter 4 for recognising that access to an educational institution should be conceived of as more than simply access to buildings and classrooms. While my own wide-ranging experience of HE gave me an advantage in terms of access to its institutions and discourses, I still had to disguise my lack of pre-requisite experience (technical drawing) and I still faced problems in the university course because I “ought” to have been taught certain things in college.

The pretences associated with difficulties in accessing discourses, identified by Bartholomae as “inventing the university”, can be very uncomfortable for students (1985). In one example (already referred to at the end of Chapter 7), Ivanic describes one of her co-researchers as:

caught in a web of sincerity and deception as she attempted to take on social roles and to portray qualities which were valued by her different readers and, wherever possible, to be true to herself.

(Ivanic, 1998:168)

In my professional life, I have met many students who express concerns about their ability to play these roles and portray these qualities, and I have referred to some in earlier chapters. Some have found that their rapid access to higher education (for example, through community-based then FE college initiatives) have suddenly “landed” them in an alien environment where “It’s like they’re speaking a foreign language.” I have heard this expression a number of times; it seems to be another example of the conceptualisation of HE as a territory, a village, or other place (see also Section 2.2).

This insider perspective has been open about the “deceptions” that an individual student uses to enable her to act on the periphery of the community. It should be acknowledged, however, that many students would find such openness risky in terms of their future participation in the community. If I had intended to pursue a mathematical career, for instance, I would never have “confessed” to my mistaken assumptions in Journal Extract 20 (Chapter 6).

Students understandably come to feel that their lack of appropriate discourse is somehow their fault or a weakness in themselves. It is understandable because they are sometimes positioned in this way, identified as “at risk”. Even the epithet “non-traditional”, while usually well-intentioned, confirms the feeling in the student that they are somehow “lacking”.

An activity theory perspective encourages us to regard this as a problem for the activity system rather than for the individuals within it. It is suggested here that further research in this area would benefit from moving away from an emphasis on identifying students at risk and towards thinking about practices and systems that are truly inclusive. Conceptualising the “problem” as a systems one rather than one associated with particular types of people would open up new possibilities.

While an insider perspective can inform such an approach, a lone insider who is wanting to progress in the system might find this too risky, as has already been suggested. There are alternatives, however. Sociocultural and academic literacies researchers who work *jointly* with staff and students in looking at their experiences of higher education are bringing much needed insights to theories about access to HE. By acknowledging that activities are jointly constructed, such writers dissipate the blame for failure to progress. It is also suggested that if more researchers look at access issues from the inside in the way that I have done, more of the hidden information about the systems might become available. If I had been a co-researcher rather than an independent one, it could have had the dual benefit of de-

emphasising individual responses (but without the loss of a focus on internalisation) and increasing opportunities for dialogue about the issues of access.

The kind of dialogue proposed for research in the paragraph above also has relevance for practice. Access courses are increasingly including commentary on the processes, and dialogue about HE with other students and with empathetic lecturers. The HE institution that I attended for my second level module does already have some excellent examples of this type of course, including one for direct entry students, though the majority do not attend. In a recent development, however, the course for direct entrants has been incorporated into the programme of study for a class that is composed entirely of third level direct entrants. This is evidence of the activity system responding to its own internal contradictions and tensions – attempting to provide the appropriate balance. The successes and failures of such ventures will be of interest to both researchers and practitioners.

8.3.3 Course design

The ability to access higher education discourses depends on the ability to engage in its activities and subordinated actions. In a revealing change in the second edition of his widely-read book *Teaching for Quality Learning at University*, John Biggs states in a chapter summary:

Learning is constructed as a result of the learner's activities. Activities that are appropriate to achieving the curriculum objectives result in a deep approach to learning.

(Biggs, 2003:11)

Despite the appeal to learner activities, (here used more in the sense of actions or possibly target activities in the current study), Biggs leaves no doubts about the normative status of academic conventions as set out in well-written curriculum objectives. The motivation or object of those activities belongs to the lecturer and to the academic tribe to which that lecturer belongs; the student should have an appropriate “learning outcome” predetermined by the system. Figure 8.2 above highlights the contradictions and tensions caused by the use of terms such as “learning outcome”, as described in Chapter 7 and Appendix 2.

The tension over definitions of “learning outcome” is heightened by the perception of some participants in the activity system of this as a bureaucratic imposition. Yet many staff and students report that they do find the idea behind a statement of desired learning outcomes (or objectives) helpful in guiding their practice.

Further research would be valuable to investigate when and how such statements are constructive, differences between perceived and actual practices, and the extent to which the use of learning outcomes amounts to no more than rhetoric or compliance. This tension affects different participants in the activity system: some lecturers feel that they have to comply with an edict to produce a list of desired learning outcomes though this is against their teaching philosophy; some students feel that they have to comply with pre-set learning outcomes that seem to stifle their own more “emancipatory” view of what education should be – that is, that it should result in personal and critical development, not just compliance with a set of sophisticated norms.

It would also be useful to explore the differences between desired and actual outcomes, a topic introduced by the current study. For those who have the task of designing courses, this tension will inevitably arise at some stage whether the designer “notices” it or not. Research that investigates local attempts at resolutions of the tension would provide a useful resource for everyone affected in the activity systems of higher education.

In terms of practice, it could be valuable to promote a shared dialogue between staff and students on the meanings and uses of “learning outcomes” and the idea of “constructive alignment” between objectives, teaching and assessment of outcomes promoted by Biggs (2003) and others. (“Learning outcomes” contribute to the orthodoxy current at the time of writing; the point about sharing dialogue applies equally to any future orthodoxies that might evolve from them.) This approach would particularly support the direct entry students who may have come from an environment where the use of the term “learning outcomes” has been different.

Dialogue between educational developers and staff on the tension over meanings and use of “learning outcomes” can also alert staff to these difficulties. One suggestion to promote such dialogue is to encourage new lecturing staff to undertake an “insider” investigation (probably on a much smaller scale than this one) and reflect on its implications for their own teaching. This could form part of a postgraduate course in academic practice that most lecturers now have to undertake. (This suggestion is being proposed to my current institution.)

8.3.4 Assessment

Assessment is a major component of course design, but it is separated here because there are specific observations that can be made about it. There are already many tensions over assessment practices in higher education and there have been a number of initiatives to research these and disseminate good practice (for example, substantial projects supported by the funding councils and similar bodies).

Assessment discussions tend to focus on: the requirement for validity, reliability and equity; dichotomies such as formative and summative assessment, exams and continuous assessment, and norm and criterion referenced assessment; and practical issues such as loading and scheduling.

The tensions exposed in the present study add a new slant to these already existing issues by asking whether we are assessing someone's **actual or potential practice**.

When Vygotsky (1934/1987) developed the concept of the ZPD and argued for assessing a child's potential, it was partly in response to the rather static tests (such as IQ tests) that were used for diagnostic purposes. However, Vygotsky's emphasis (reiterated in the current study) on the role of the ZPD on instruction has implications for assessment as well. If students are being instructed within their ZPD, are we assessing the "completion" of that process or a stage on the way? I shall return to this point, after first considering the impact of the tensions over assessment that I experienced first hand.

The insider perspective has highlighted several occasions where my fellow students and I found ourselves able to perform actions for the first time even though the same actions had previously been "passed" because they were essential to particular

activities. John's ability to do division, after passing a mathematics test (Section 6.2.3) and my ability to read enthalpy tables, after passing a thermofluids test that depended on them (5.2 and 5.4) demonstrate this issue.

Further research would undoubtedly uncover many examples of students who only appear to be able to do things and have already passed assessments that seem to depend on this. There are already suggestions in the literature; for example, students studying motion who have "passed" the relevant assessment but still display what appears to be an inappropriate conception of force in other contexts (Svensson, 1989).

Much has been said already in this chapter about the ways our research and practices can "mask" what is actually going on (resulting in inadequate "thin" descriptions). Research on assessment that attempts to unmask the issues of what a student is "really" able to do could have a major impact on practice, possibly a devastating one for a society that is so dependent on summative assessment. As a student at college and university, I experienced first hand some of the more controversial aspects of that dependency on assessment. I passed *some* assessments that:

- I could not have done again
- the teacher had "fixed" for me so that it looked as though I had done it
- were a close imitation of a previous example, thus demonstrating the ability to substitute numbers rather than solve the problem
- were based on my knowledge of what the teacher was looking for rather than what I really thought the "answer" was

- were a record of an event that I had not attended.

Usually, these examples emerged in response to expediency rather than an inherently corrupt system, so I do not want to overemphasise the point nor castigate the lecturers and institutions involved. I also know from discussions with others that these examples are commonplace; they will not surprise any reader of this thesis.

Nevertheless, practices that resolve the above problems are very likely to result in additional tensions in the system – particularly one related to retention of students. Anecdotal evidence suggests that the practices may be on the increase in departments and institutions where retention of students is a particular issue, particularly when this is associated with wider access. When there is a deficit model of students behind the argument, then this becomes a matter of resentment for lecturers and even for students who feel that the whole endeavour of higher education has become devalued because “inappropriate” students have been admitted and have to be retained for the institution’s financial well-being.

If the underlying model is of the ZPD, however, assessment of students becomes an assessment of their potential rather than a statement of a completed ability. This seems to be more in keeping with what actually happens; in a modular system, students are rapidly exposed to ideas and assessed on them before they could realistically be expected to have developed word meaning and conceptions over time. If Vygotsky is correct in saying that instruction is ahead of development (Vygotsky, 1934/1987), then an immediate assessment of that instruction is also likely to be based on performance that is ahead of development. This would

account for my ability to pass things that I did not “know” – I had the potential to use what was available in the repertoire before the meaning had actually developed.

The insider perspective thus raises some uncomfortable issues about *what* we are assessing; it is suggested as a result that research on assessment should take into account that a process of development may be incomplete and indeed that this should be the case if the students are engaged in valuable learning.

In universities, where assessment dominates and pervades all other activities, the implications of the insider perspective may be even more uncomfortable for practitioners than it is for researchers. It is suggested that the issue of assessing “incomplete development” should be a topic for discussion with new lecturers and also with students. The list of my perceived progress with discourse (Figure 6.2 in Chapter 6) might be a useful trigger for such discussions. This list could also be useful to consider as a reference point for how assessment regimes support or act as barriers to such development. Again, this is a case where additional “insider” perspectives and possibly “co-researched” initiatives would provide richer data, and demonstrates an area where research and practice could usefully coincide.

8.3.5 Certification

If assessment may be of incomplete development, then what does this say about certification? My HNC in Mechanical Engineering and my second level university module in Engineering Design have what Zygmunt Bauman has described as “an exchange value” (Bauman, 1997: 23). By awarding these certificates, the two institutions are saying something about the student; indeed, it was only through

having the HNC that I was permitted to do the second level module. The absence in my repertoire of things that we “ought” to have learned at college suggests that the exchange value of the HNC was not (and is not) infallible; nevertheless, the principle of certification is essential to the smooth functioning of society. As a society, we do not have either time or resources to determine what a person can or cannot do; when we need this information, we look for evidence in terms of qualifications and certificates from reliable sources.

From the insider perspective, the student can only consider whether the qualifications truly represent what she can do or has the potential to be able to do; it is up to others to judge whether that is warranted or not.

An argument against qualifications that do not represent complete development can be readily anticipated: “I don’t want my doctor, nurse or structural engineer to be only partially developed – I want the assessment to guarantee competence in certain activities.” (A similar argument is sometimes raised in relation to a 40 per cent pass mark, for example.)

The need to warrant complete mastery of a skill – for example, of giving an injection or of identifying excessive loading on part of a bridge – is built into some professional HE courses, sometimes using the notion of “fitness to practice”. At the earlier stages of these courses, however, such skills need to be applied in “safe” circumstances; it is already recognised by “the system” that mastery is not achieved through a single exposure to an idea. In such cases, it is more likely to be clear cut that students need adequate exposure to the discourses and opportunities to practise.

The certification warrants that they have been given this and that in this case they have not just the potential but also the expert level of practice. It would be a mistake to infer from this that all HE certification warrants the expert practice of specific skills.

From these insights into the insider perspective, then, it is suggested that debates about higher education certification should consider the balance between mastery and potential for development. All stakeholders (students, lecturers, employers, parents, funding bodies etc) should have an interest in this and if there are different perceptions, then they should perhaps be exposed as tensions in the system. This is a clear example of a tension that may need to be retained, to ensure an appropriate balance. The debates have an implication for both research and practice, though they generally tend not to take place in HE classrooms at present. The balance may well be different for different types of degree; and this in turn will be affected by competing demands for uniformity of qualifications on the one hand, and flexibility and variation in them on the other.

A single insider perspective cannot contribute significantly to debates about qualifications and certification, yet the “thick” descriptions of my achievements of my HNC and second level university module do reflect some issues with implications for all students and other stakeholders. The issues particularly highlighted here are whether target activities should be “completed” and how to recognise potential as well as actual development. Different stakeholders would raise different tensions, and these sets of tensions will also interact – e.g. value for

the individual versus value for society – making the activity system a very complex one indeed.

8.4 Conclusion

The study has suggested that students' responses to discourse can be usefully investigated by combining an insider perspective with a sociocultural approach.

In research terms, the study has stressed:

- the unit of analysis – are we looking at the right thing?
- thick and thin descriptions – are we looking at it as fully as we should do?
- metaphor – do our metaphors and frameworks cover the issue in its complexity?

By using “what the student noticed” as a unit for analysis and considering the “thick” descriptions of actions and activities, the study has been able to identify issues for students “on the edge” of a discipline. Academic institutions are both literal and metaphorical places, with the changing environment providing a backdrop to the whole study. The idea of place needs to go beyond a geographical metaphor of territories, boundaries and peripheries of practice; a geological orientation is also necessary to recognise the meanings in discourses, activities and artefacts that have evolved over a long period and as a result of tensions in the system.

Finding a way to respond to and engage with academic norms in a new “territory” in this world has been a difficult though exciting project. How much more difficult will it be for a student for whom the world as well as the territory is new? The study has

exposed only some of the tensions that students face; a single insider perspective is only the tip of the iceberg.

It has been suggested in this final chapter that current tensions in higher education will benefit from:

- **research** that does not cause relevant information to be left hidden, and can respond to the changing context
- **wider access and participation** initiatives that integrate students into the discourses and not just the buildings
- **course design** that exposes its key principles to scrutiny and dialogue
- **assessment** that acknowledges the role of the Zone of Proximal Development
- **certification** that appropriately reflects an individual's attainments and/or potential.

A need for increased dialogue, and attempts at shared meaning, between all the participants in higher education underlies each of these themes. To succeed, students need a good deal of exposure to appropriate discourse practices as well as time to assimilate them. To help students, staff will need to be engaged in these practices too.

Appendices

Appendix 1: Identifying themes and categories

1(a) Themes from the journal

1 (b) Themes organised over time and subjects (Year 1)

1 (c) Concordance file to produce index entrie

1(d) Index produced with concordance file

1 (e) Condordance index for engineering

Themes from the journal

How I'm going to cope
 What happens here?
 Relationships with previous/other learning
 "I don't think I'll keep doing this"
 Noticing what other students do
 Nature of the subject itself
 A specific problem (orders of magnitude)
 Time management
 Language and technical ideas
 Key issues emerging
 Work I enjoy
 Discussions with lecturer
 Understanding
 PhD issues
 Other lecturers' experiences
 Ethics
 Observations of other student experiences
 "Spoonfeeding"
 Interpretation of expectations at an early stage
 Articulation of problem
 Assessment
 Feedback
 Question
 Zone of proximal development
 Teachers' own fears of being found wanting
 Overwhelmed by information
 Scaffolding
 Cues and rituals
 Discomfort about interviewing
 Observations
 Assessment
 Asking for help
 "I can't do this because..."
 "Do it mechanically"
 Difficult concepts
 Enjoyment of class
 Carelessness
 Logic
 Doing until it's familiar
 Resolution of problem with orders of magnitude 28/9
 Honest about understanding
 Coping with new concepts

Cheating
 What I don't know yet
 Tiredness
 Missing the point
 Class swot
 Understanding conventions (Tommy)
 Stress
 Essential help versus working it out yourself
 Coverage of content
 Jumping through hoops
 "Models"
 Having a "way in"
 Gaps, misconceptions & misunderstandings
 FE/HE
 Status of institution (class)
 Halo effect
 Learning v getting through assessments
 Peer support
 Abstract ideas (e.g. symbols)
 Lost
 Absorption rate
 Preparation
 Real world
 Assessment/comparison of lecturers
 Other students and this study
 Computers
 Collaboration
 Attitude (night and day)
 Use of journal
 External interest in ideas
 Established seating
 Enjoyment of classes
 Authentic student
 Power relationship
 Lack of teaching
 Missing steps
 Effect of external worries
 Participation in a community
 Comparison against research
 Concerns about sequencing of course
 Pub
 Group at ease with each other
 Women and engineering
 Losing authenticity
 Selection for journal
 Swearing
 Engineering – snobbery

Body language

Everyone has to go through phases

Teasing

Seeing things the lecturer doesn't see

Class thoughts about next year

Qualification vs experience

Frustration

	September	October	November	December	January	February	March	April	May
Discussions in breaks and before start of class	1) Thermofluids 2) Maths				1) Statics & Dynamics 2) CAD			1) Communications 2) IT	
	what we didn't understand; how we were finding the course	what answers we got	general social chat						
A new module -- which classroom?			We're here and the lecturer's there. (We're right.)	We're here and the lecturer's there. (We're right.)					
We'll decide!					"We always leave about this time."	"We'll stay for a little while, then we'll go." (Lecturer -- you're all adults.)			
Reflections on expectations and the course itself.			Good and bad lecturers.				"Some of us are paying for this themselves. We should have all the facilities open to the day students"		
							Lecturers not entirely aware of the course the group is doing (especially 2). Group questions relevance to rest of course.		

	September	October	November	December	January	February	March	April	May
	1) Thermofluids 2) Maths			1) Statics & Dynamics 2) CAD			1) Communications 2) IT		
Socialisation of cohort	Establishing seating, routines, noticing each other; polite support			Social night (Xmas)	Reliance on fellow students				
Teaching methods	1) Dictation and problems 2) Careful demo and problems*			1) Demo, problems, real-life* 2) Largely self and peer teaching			1) Largely self-teaching; lect. feedback 2) Largely self and peer teaching		
Assessment methods	1) Open book, based on examples 2) With notes, 100 per cent required			1) Open book, 100 per cent required 2) Assessment was all we did			1) Report and presentation 2) Assessment was all we did		
Approaches to learning									
General (from observation)	Manipulating to get the answers right Questioning "Just do mechanically" encouraged (1) Recognition by students that this isn't learning			Manipulating to get the answers right Questioning. Attempting to understand. Challenging when appropriate. Seeking out peer support. If teaching poor, then plagiarism acceptable			Research, especially Internet. Trial and error. What's necessary to complete this?		
Christine (from introspection)	Instrumental when necessary (1) Eliminating misconceptions Reframing in familiar language			Interest in "models" and formulae. Finding ways in to unfamiliar ideas. Trial and error. Seeking external help in overcoming spatial difficulty			Research. Trial and error.		
General mood of cohort	Individual motivations and interests			Increasing interdependence			Strong interdependence. Some frustration, cynicism, disillusionment		

* = highly regarded lecturer

1) Thermofluids 2) Maths	1) Statics & Dynamics 2) CAD	1) Communications 2) IT
Questions – encouraged and supported by lecturers. Most questions from <u>Tutorials</u>; examples below		
When will this become relevant? Why did you do that?	What equation do we use? Will this come up in the assessment?	What does "syntax" mean? How do you do this?
Observations on what's acceptable/expected		
I'll make a contents page! (open book test)	What's the point if we're not learning anything?	You should just copy someone else's drawings. The teaching's been so bad
Heuristics		
Do it mechanically - just put in the numbers(1) Write down everything you know. (1) Always check the answer (don't develop bad habits) (2) Move on the diagonal (2) (changing subject of formula)		Try to get used to the scale of the answers. (1)
Comments on what's acceptable/expected		
It's open book – you don't have to remember it (like I had to) (1) We spoonfeed you here (2)	These are things people have difficulties with. It's been proved in the past. (1) Don't think mechanics is something you have to put another head on for. (1) This is based on tech drawing principles. It helps if you think back to the way you did this at	This is a research based module. You'll do it in the Library. (1) "OK. Get started" (2)

Teaching

September	October	November	December	January	February	March	April	May
1) Thermofluids 2) Maths				1) Statics & Dynamics 2) CAD		1) Communications 2) IT		
Scientific uses of known words								
New words								
Translation with dictionary								
Roles of numbers, SI units and symbols								
Interference from other disciplines; from other formulae; everyday language.								
<div> <div> Socialising – acceptance of swearing. Some swearing at CAD program! Jokes about next module – industrial communications. </div> <div> Jokes about my questionnaire. Called "hen" by Teaching on last day. </div> </div>								

Christine

Concordance File ^{Appendix 1}
to produce index entries

Jim	Peer support
Alistair	Peer support
Tommy	Metacognition
metacognitive	Metacognition
model	Model
understanding	Understanding
zoped	Zone of Proximal Development
Vygotsky	Vygotsky
cheating	Cheating
halo	Halo effect
careless	Carelessness
carelessness	Carelessness
modelling	Model
real world	Real world
real life	Real world
peer support	Peer support
scaffolding	Scaffolding
scaffold	Scaffolding
journal	Journal
community	Community
"see"	Just seeing...
"saw"	Just seeing...
"steal"	Cheating
interference	Interference from other disciplines
pub	Socialising
struggling	Difficulties with work
self-instruction	Concerns with teaching methods
deep	Deep and surface learning
surface	Deep and surface learning
frustration	Frustration
time	Time management
FE	Further Education
women	Women
engineering	Engineering
authenticity	Authenticity
authentic	Authenticity
swearing	Swearing
coping	Coping
cope	Coping
tired	Tiredness
tiredness	Tiredness
stress	Stress
stressed	Stress
lecturer	Lecturers
lecturers	Lecturers
Ian	Lecturers
Matt	Lecturers
Mr Stevenson	Lecturers

David	Lecturers
Steve	Lecturers
Sharon	Lecturers
Theresa	Lecturers
Hilary	Lecturers
Paisley	University of Paisley
James	University of Paisley
Tim	University of Paisley
enjoy	Enjoyment
enjoyment	Enjoyment
absorption	Absorption rate
field dependence	Field dependence
field dependent	Field dependence
Witkin	Field dependence
language	Language
words	Language
dictionary	Language
assessment	Assessment
outcome	Assessment
assess	Assessment
learning	Learning
learn	Learning
learned	Learning
learns	Learning
phenomenography	Phenomenography
phenomenographic	Phenomenography
zone	Zone of Proximal Development

Absorption rate	18, 24
Assessment	1, 7, 8, 11, 14, 15, 18, 19, 20, 21, 22, 23, 24, 27, 29, 36, 47, 48
Authenticity	33, 38, 39, 42, 43
Carelessness	4, 6, 7, 9, 13, 14, 19, 21, 23, 32
Cheating	11, 36, 37, 38
Community	21, 27, 34, 40, 42
Coping	2, 13, 27, 32
Deep and surface learning	18, 19, 35, 48
Difficulties with work	1, 3, 7, 14, 30, 32, 46, 47, 48
Engineering	25, 26, 29, 38, 39, 42, 44, 45
Field dependence	2, 3, 4, 29, 30, 31
Frustration	31, 49
Further Education	6, 20, 23, 27, 35, 39
Halo effect	20, 21, 34, 38
Interference from other disciplines	33, 37
Journal	2, 10, 17, 20, 24, 37, 38, 41, 42, 45, 49
Language	2, 3, 4, 5, 6, 11, 12, 13, 14, 15, 18, 22, 29, 30, 39, 40, 41
Learning	1, 2, 4, 5, 6, 7, 9, 10, 11, 13, 14, 15, 18, 19, 20, 21, 22, 23, 29, 33, 35, 38, 39, 40, 42, 43, 44, 45, 46, 47, 48
Lecturers	1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 15, 17, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 38, 39, 40, 42, 43, 44, 45, 46, 47
Metacognition	20, 21, 23, 25, 26, 27, 29, 30, 31, 33, 38, 39, 40, 44, 45, 47, 48
Model	15, 19, 22, 25, 28, 30, 37, 41
Peer support	25, 26, 27, 28, 31, 32, 36, 38, 39, 40, 41, 42, 44, 45, 46, 47, 49
Phenomenography	33, 35, 38, 44, 47, 48, 49
Real world	5, 24
Scaffolding	6, 7, 18, 24, 25, 27, 32, 36
Socialising	26, 38, 42, 46
Stress	15, 17, 24, 30, 38, 48
Swearing	41
Time management ...	1, 3, 4, 5, 8, 9, 11, 13, 14, 15, 17, 19, 21, 24, 26, 27, 30, 33, 35, 36, 39, 41, 42, 49
Tiredness	14, 23, 24, 33, 38, 46
Understanding	1, 6, 8, 23, 24, 33, 34, 36, 41
University of Paisley	7, 9, 10, 20, 21, 22, 23, 26, 29, 30, 31, 32, 39
Vygotsky	3, 5, 29, 30, 33, 44, 47
Women	39
Zone of Proximal Development	6, 9, 14, 15, 19, 24, 47

10 ³	calculation
3 rd angle projections	method/process
actual work	professional engineering
adiabatic	new vocabulary
aerodynamics	subtopic in engineering
aerofoils	new vocabulary
angular	method/process
arcs	measurement
area	measurement
arrays	method/process
at work	professional engineering
atmospheric pressure	measurement
Autocad	subtopic in engineering
Autofill	method/process
bar	measurement
beam	new meaning of word
bending moment	new vocabulary
boilers	practical application
CAD	subtopic in engineering
calculation	calculation
calculations	calculation
Carnot cycle	method/process
chamfer	new vocabulary
communication	subtopic in engineering
communications	subtopic in engineering
conservation of energy	method/process
conservation of momentum	method/process
density	measurement
differentiation	calculation
dimensions	measurement
dimension	measurement
direction	method/process
displacement	method/process
draughting	method/process
drawing	method/process
dynamics	subtopic in engineering
energy	new meaning of word
engineer	engineer
engineering	engineering
engineers	engineer
enthalpy	new vocabulary
entropy	new vocabulary
equation	calculation
equations	calculation
Excel	method/process

Excell	method/process
factor	calculation
fillet	method/process
filleted	method/process
force	new meaning of word
forces	new meaning of word
formula	calculation
formulae	calculation
frames	method/process
fringe	method/process
g	abbreviation
gas	object of study
gauges	method/process
geometry	calculation
gravity	measurement
hatched	method/process
heat	new meaning of word
heat transfer	method/process
indices	calculation
integration	calculation
interferometry	new vocabulary
inverses	calculation
isothermic	new vocabulary
joules	measurement
linear	method/process
linetype	new vocabulary
macros	method/process
magnitude	measurement
manipulating	calculation
mass flow energy	method/process
materiel	new vocabulary
maths	subtopic in engineering
mechanics	subtopic in engineering
metrology	subtopic in engineering
moment	method/process
moment of inertia	method/process
N/m^2	calculation
NA	abbreviation
negative	calculation
negatives	calculation
newton	measurement
non-flow energy	method/process
order of magnitude	calculation
orders of magnitude	calculation
parallax	new vocabulary

polytropic	new vocabulary
practical	professional engineering
pressure	measurement
pulley	method/process
QA	abbreviation
quality	subtopic in engineering
reciprocals	calculation
reversibility	method/process
rho	new meaning of word
rotary table	method/process
saturation	method/process
science	related topic
Second Law	method/process
second moment of area	method/process
shaft	new meaning of word
shear force	method/process
SI	abbreviation
sketches	method/process
specific	new meaning of word
specific volume	measurement
specification	method/process
statics	subtopic in engineering
steady flow	method/process
substitute	calculation
substitution	calculation
tan	calculation
tech drawing	subtopic in engineering
technical drawing	subtopic in engineering
temperature	measurement
tension	measurement
thermodynamics	subtopic in engineering
thermofluids	subtopic in engineering
transpose	calculation
transposition	calculation
trig	calculation
trim	method/process
unit	calculation
units	calculation
vapours	method/process
vol	measurement
volume	measurement

Appendix 2: What is a learning outcome?

Categorised responses to this question from:

111 members of staff

260 students

at a new university

April 2002

This document was made available to staff and students who responded or anyone else who requested it.

What a learning outcome is

I have used italics to show categories I added when going through the students' answers.

CATEGORY	STAFF	STUDENTS
A result Including gain, change, development, product, response, what a student knows/can do, measurement, <i>end point</i>	53	23
An anticipatory statement including statement of intent, aim, goal, prediction, expectation, hope, standard, guide, target, <i>requirement</i>	29	30
Both anticipation and result clearly specified including those who recognise there may be a difference between the aspiration and the actual	5	2
Indefinable including meaningless term, educational jargon, don't know, <i>no response</i>	5	14
Assessment including forms of assessment, measurement, <i>evidence</i>	4	17
An element of a course including topics, subject, <i>part of module, theories and concepts, information, facts, learning resources, the main point(s), a module, exercises, tasks</i>	4	10
A combination of being a bit of a course and the assessment associated with it	0	4

The figures are percentages. In this case, they add up to 100 per cent in each column. In my final analysis, I made a judgement on a single category for each answer. For example, there were more references to "educational jargon" and even "meaningless term" than are represented here. There were 8 such statements in the 111 responses from staff. In cases where this was the strongest point, I allocated it to the category. However, in other cases, the writers also included a definition that appeared to be the one they wanted to be considered. The students who found it indefinable did not use this language, although there were a couple of criticisms of learning outcomes. Their contribution to "indefinable" is "don't know" or no response (they responded to four other questions relating to Faculty, year etc).

The main issue to highlight here is that 45 per cent of students who responded do not know what a learning outcome is or think it refers to an assessment or element of a course. This could be a problem for the institution because its scheme is different from the SQA one that some students have experienced previously. A single assessment might refer to several learning outcomes or a single learning outcome might be assessed in more than one assessment. There may not be an exact correlation between a learning outcome and a "chunk" of the course. Students need to be aware of this or there may be unmet expectations.

What a learning outcome relates to

CATEGORY	STAFF	STUDENTS
Knowledge including learning, understanding	54	48
Skills including behaviour, doing, demonstration, use, application, ability, competence, experience, practical knowledge	58	13
Attitudes including judgement, emotions, attributes, the affective domain, <i>values</i>	16	2
Achievements including completion, product	9	14
Teacher/student role <i>including evaluation of teaching, making sure each element is taught, ability to pass, learning correct stuff, position in relation to class, progress, whether course is what student requires</i> [I added this when analysing the students' results, but did then realise that 3 staff had made reference to it as well.]	3	7

These are still percentages, but of course people have referred to more than one relationship.

I have perhaps over-summarised here, but “knowledge, skills and attitudes” was also a recurring phrase. I had originally separated off behaviour, but ran into some difficulties in whether to categorise “ability to do” as a skill or piece of behaviour. It perhaps hinges on whether we mean “ability to do repeatedly” or not (and a couple of people made specific reference to this).

Another recurring phrase was knowledge and understanding, even abbreviated to K and U (in both staff and student responses). There is a debate (alluded to by a couple of respondents) about the use of such terms within statements of learning outcomes.

The students put more emphasis on achievement and completion than on practice.

How a learning outcome is delineated

CATEGORY	STAFF	STUDENTS
Resulting from an intervention or experience including teaching, directed experience, self-study, material/content, training	39	20
Relating to criteria including topic, approach, level, aims and objectives, product, context, repeatability, improvement (or otherwise) <i>ability to retain, predetermined</i>	24	8
At or by a defined end point most frequently "end of module", but including course, unit programme, <i>sub-topic, lecture, at certain stages, to allow progression</i>	18	30
Assessable/measurable NB: students tend to say "is assessed", <i>including can be corrected, building up to final award</i>	15	13

The "completion" theme for students surfaces even more strongly here. It also ties in with the view of learning outcomes as referring to discrete pieces of knowledge. I also became aware towards the end of my "counting" that students made far more reference to modules than staff did. It might be worth taking a closer look at this.

One member of staff said that assessment should be pass/fail and not graded, and some others made reference to the problems of grading. The institution will need to make its policies on grading very clear – i.e. that it is keeping the 40 per cent pass mark. Some staff have wondered what allocating 40 per cent to an outcome might mean.

Limitations of the learning outcomes approach

Staff views

1. there is lack of clarity of definition among “professionals” (4)
2. emphasis on completion rather than approach causes problems (4)
3. there may be unplanned outcomes as well as planned ones (3)
4. some learning resists measurement (2)
5. there will be varying degrees of competence in the students
6. LO explicitly excludes understanding and personal enrichment
7. they have to be drawn so widely they are useless
8. there is a need to keep QAA happy while not letting it interfere with teaching
9. confusion and uncertainty are often the best “outcomes” (relating to increased curiosity and interest)
10. achievement may depend on subsequent opportunities
11. the LO approach does not acknowledge the role of tacit knowledge

Student views

- outcomes are self-evident and shouldn't have to be spelt out in this manner
- they are no use at all (to help study) when handed out in Week 10 (actual example given)
- topics inter-relate more at university than they do at college.

Views expressed by both a member of staff and a student

1. too short time span discourages reading and reflection
2. it means different things in different situations
3. it would be better to investigate the use of the learning outcomes approach rather than the definition of a learning outcome

Some quite strong feelings were expressed and they are not adequately reflected in the above.

There was one positive note from a student:

“I find that if I know my learning outcomes my study has been successful; if I know more it is even better.”

and another student used the opportunity to praise her course (postgraduate E-learning for Teachers) where she concluded “my life has been enriched”. This is indeed a very welcome outcome.

Appendix 3: Examples of Problems with Notation

Notation is a major issue for novices. One letter caused me a lot of problems – the letter g. Here are four different places where g occurred.

However, the question on the sheet has atmospheric pressure in mmHg and I still don't know what that means.

mm = millimetre = m/100

Hg =?

Journal 1/10/97, early morning

[Looking up the dictionary to find the units for pressure. Because of the emphasis on SI units, I was thrown when an abbreviation for mercury was used as well.]

Pressure = ρgh

What is g in ρgh ? (gravitational acceleration)

People keep asking about 9.81 (g)

Notes during class 11/11/97

[This expression just turned up and it was assumed that we would recognise g as gravity. However, we did not and most people could not see where 9.81 came from.]

Learned a very simple thing from yesterday that seems ridiculous not to have pursued before but I didn't know where to start. Last year I simply did not understand the steam tables. Abbreviations got in the way again h_g = enthalpy of a gas and h_f means enthalpy of a fluid. The diagram we used for refrigeration explains it all.

Journal 16/4/99

Main thing to note is confusion I had over v_g – specific volume (as it appears in tables). Sometimes just v is concerned. Asked Andrew [student] to explain and I kept saying I wanted to add gravity (because of an experience last year). He kept saying “it’s specific” but because he didn’t say “it’s got nothing to do with gravity” I didn’t get the point. I had to go to Gordon [lecturer] – teased a bit about not believing A but in fact I’d misunderstood.

Journal 22/4/99

In the examples above, the focus was misled by other information or just missing. In the case of missing information, the key is for the student to recognise that it is missing and be prepared to ask questions about it. They will not necessarily understand the answers though, as I discovered when I shared my problems with g with a class of my own.

Christine	Did you ever feel that important steps are missed out or just assumed, for example all of a sudden there's a g in the equation “Oh that's gravity”?
Student(s)	Yes – and you say what's that squiggly thing and they say “that's sigma”. Oh RIGHT.
Much agreement on this!	

Journal 12/11/98

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